Chapter V – Affected Environment and Environmental Consequences

Chapter V

Affected Environment and Environmental Consequences

INTRODUCTION

This chapter discusses the existing physical, biological, and socioeconomic resources in the study area (affected environment) and the Federal action's anticipated environmental effects (environmental consequences) on specific resources. All the resources within the study area are described in the affected environment portion of this section; however, only the resources that may be potentially affected by the three alternatives are analyzed in the environmental consequences portion. The No Action Alternative is the basis of comparison for the two action alternatives. The No Action Alternative describes future conditions if neither of the action alternatives is implemented. The depth of analysis corresponds to the scope and magnitude of the potential environmental impact. If a resource may be adversely affected, appropriate mitigation measures are presented.

The environmental analysis of the potentially affected resources is based on professional judgment and the experience of Bureau of Reclamation (Reclamation) staff specialists, discussions with other experts and professionals, literature review, and field trips to the study area by resource personnel.

It is the goal of this chapter to quantify, to the extent possible, impacts of each alternative on the analyzed resources. However, if quantitative estimates are not possible, qualitative estimates are provided to facilitate comparison between alternatives needed for the planning process.

It is assumed for the environmental analysis portion of this report that recreational use at Canyon Ferry will occur, regardless of which alternative is chosen. Impacts to the affected (existing) environment are discussed from a programmatic standpoint because exact construction activities are not known at this time; all that is known is that a particular activity might occur.

HYDROLOGY

The Resource Management Plan (RMP) is not intended to address reservoir or powerplant operation issues. Operations included in the RMP are the current operations criteria and are intended only to set the stage for recreation and other natural resources planning activities.

Affected Environment

Reclamation completed construction of Canyon Ferry Dam in 1954. The reservoir is operated to provide flood control in cooperation with the U.S. Army Corps of Engineers (Corps); to provide a water supply for power generation in coordination with PPL Montana (formerly Montana Power Company [MPC]), irrigation, and municipal and industrial uses; and to enhance recreation, fish, and wildlife benefits (figure V-1).

The United States of America, Department of the Interior, Reclamation, holds the water right for water stored in Canyon Ferry Reservoir. The water right, 411-W-040923-00, has been listed in a temporary preliminary decree issued by the Montana Water Court. The water right did not receive any objections during the initial Water Court process, so the water right will essentially appear unchanged in a final decree for the river basin. Federal legislation authorizes the Secretary of the Interior (Secretary) to contract to supply water for authorized purposes from Federal storage facilities such as Canyon Ferry Reservoir. The only authorized water use from Canyon Ferry Reservoir is for those water uses that are covered by a contract with Reclamation.

Reclamation water rights for Canyon Ferry Reservoir are either storage type rights or direct diversion rights. Reclamation has a storage right for 1,952,059 acre-feet, and PPL Montana has a storage right for 47,500 acre-feet at elevation 3800 feet, the storage capacity of the original Canyon Ferry Dam, which was replaced by the current reservoir. The direct diversion rights, totaling 7,190 cubic feet per second, include flows for the Helena Valley Irrigation District pumps, pump turbines, and the Canyon Ferry powerplant turbines.

There are water rights that are senior to the water rights Reclamation has claimed for Canyon Ferry. PPL Montana owns six hydropower dams downstream from Canyon Ferry and one hydropower dam upstream from Canyon Ferry, all with water rights senior to Canyon Ferry. These prior rights are satisfied through compliance with the terms in the 1972 Coordination Agreement between PPL Montana (then Montana Power Company) and Reclamation.

Canyon Ferry Dam is 225 feet high (172 feet above streambed), 1,000 feet long at the crest, and 173 feet wide at its base. The reservoir has a storage capacity of 1,891,888 acre-feet at elevation 3797 feet, normal operating full pool. There are four methods of releasing water from the reservoir: (1) through the spillway, (2) through the river outlets, (3) through the turbines, and (4) through the Helena Valley Pumping Plant. (Figure V-2 shows Canyon Ferry Dam and Reservoir design criteria.) The average discharge from the reservoir is 5,400 cubic feet per second (cfs). December-February discharges average 4,945 cfs, and June-August discharges average 6,400 cfs. Actual discharges are primarily determined by inflows and reservoir content. When the reservoir is at elevation 3800, the spillway has a maximum discharge capacity of 150,000 cfs, controlled by four radial gates. The dam has four river outlets that have a maximum combined discharge capacity of 9,400 cfs. However, restrictions placed on the operation of the river outlet gates has limited the maximum discharge to 2,000 cfs unless there is an emergency.

Canyon Ferry Dam and Reservoir Operational Objectives

Power Generation Benefits

Flood Control Benefits

Irrigation Benefits

Municipal Benefits

Industrial Use Benefits

Fish and Wildlife Benefits

River and Lake Recreation Benefits

Water Quality Benefits

Figure V-1.—Canyon Ferry Dam and Reservoir operational objectives.

Canyon Ferry Dam and Reservoir
Design Criteria

Dam:
Concrete gravity structure
Structural height = 225 feet; hydraulic height = 172 feet
Length = 1,000 feet
Volume = 414,400 cubic yards of concrete

Powerplant:
Three 13.5-foot-diameter penstocks through dam at right of spillway section
Three 23,500-horsepower hydraulic turbines
Nameplate capacity = 50 megawatts = three generators rated at 16.667 megawatts each
Powerplant capacity = 5,800-6,000 cubic feet per second at maximum head of 160 feet

River Outlets:
Four 2.0-foot-diameter conduits, each controlled by 77.0-inch regulating gates
Capacity at elevation 3800 = 2,350 cubic feet per second for a total of 9,400 cubic feet per second

Spillway:
Overflow section in center of dam controlled by four 51.0 x 34.5-foot radial gates
Capacity at elevation 3800 = 150,000 cubic feet per second

Helena Valley Penstock:
One 13.0-foot-diameter penstock through dam at left of spillway section
Capacity = 780 cubic feet per second

Canyon Ferry Reservoir:
Maximum water surface: elevation = 3800; storage = 1,992,997 acre-feet
Normal operating full pool: elevation = 3797; storage = 1,891,888 acre-feet
Surface area: at elevation 3800 = 33,535 acres; at elevation 3797 = 32,798 acres

Figure V-2.—Canyon Ferry Dam and Reservoir design criteria.

A 50,000-kilowatt powerplant is located on the right bank of the river adjacent to the spillway basin at the toe of the dam. The powerplant houses three turbines that have a total discharge capacity of 6,400 cfs. During years when no spills are required to control the fill of Canyon Ferry Reservoir, about 93 percent of the water leaving the dam is released through the turbines, producing an average of 405 million kilowatthours of energy annually. The remainder of the water is released for Helena Valley Irrigation District irrigation needs. Power from Canyon Ferry is transmitted by PPL Montana to the Western Area Power Administration grid, which then markets the power.

Irrigation water is being supplied to about 15,000 acres on the Helena Valley Unit. A pumping plant located below the dam has two pumps powered by hydraulic turbines. When operating at capacity, the pumps deliver about 350 cfs to the Helena Valley Canal, and the turbines discharge an additional 350 cfs back to the river. Actual flow in the canal varies with irrigation demand.

Stored water for irrigation is also supplied to upstream irrigators by exchange contract. Under such a contract, the junior priority upstream irrigator can divert natural flows as necessary to meet irrigation needs. Stored water is then released from the reservoir to supply the senior natural flow water rights of PPL Montana downstream from Canyon Ferry. Since 1989, Reclamation has imposed a moratorium on the further issuance of water service exchange contracts upstream from Canyon Ferry. Temporary (1-year) water service contracts are issued below Canyon Ferry on a case-by-case basis. The moratorium will remain in force, pending the outcome of a water quality study that will determine the impacts that additional depletions will have on arsenic concentrations.

Water users pay a proportionate share of the capital and operation and maintenance (O&M) costs of Canyon Ferry. There is adequate water storage for additional private and Federal irrigation development, but no projects are planned.

The city of Helena receives a portion of its municipal water supply from Canyon Ferry. Water is delivered via a canal and tunnel system to the Helena Valley regulating reservoir and is then piped to the city's treatment plant. The service contract with Reclamation entitles the city to 5,680 acre-feet, but annual use by the city depends on the availability of water from other sources.

Canyon Ferry Dam stabilizes the flow of the Missouri River. Snowpack in the 15,760-square-mile drainage area above the reservoir is measured each winter. Based on monthly water supply forecasts, releases are scheduled from the dam in amounts sufficient to prevent flooding, while ensuring an adequate storage supply for irrigation, power generation, recreation, fisheries, and wildlife needs later in the season. (Figure V-3 shows Canyon Ferry Reservoir operating criteria.)

Canyon Ferry Reservoir Operating Criteria

Whenever an adequate water supply is available, operate Canyon Ferry Reservoir to maintain a minimum flow of 4,100 cubic feet per second in the Missouri River immediately below Holter Dam to protect the quality and quantity of the river fishery. When an adequate water supply is not available, the next critical flow levels are 3,000 cubic feet per second and 2,800 cubic feet per second.

During a series of dry years, filling the reservoir is restricted to maintain the minimum flow levels.

Based on monthly forecasts prepared from January through June, releases are adjusted to allow storage to fill to elevation 3797 (top of joint-use pool) by the end of June.

Attempt to release all water through Canyon Ferry Powerplant and avoid spilling any water past the powerplant, except during times of unusually heavy inflow or scheduled powerplant maintenance.

For downstream flood control purposes, avoid making releases that would cause flows in the Missouri River to exceed 20,000 cubic feet per second at Cascade, 25,000 cubic feet per second at Ulm 6E, or 77,000 cubic feet per second at Fort Benton.

After storage has peaked, usually in June or July, releases are adjusted to evacuate storage and provide adequate space to control the next season's snowmelt runoff.

Avoid dropping Canyon Ferry Reservoir below elevation 3785 from Memorial Day weekend, in late May, through the Labor Day weekend, in early September, to protect flat water recreation interests.

Maintain releases to the Missouri River at minimum desired flows during October and early November to protect brown trout spawning through the fall and winter.

Avoid dropping the reservoir level during April and May to protect fish spawning in the reservoir.

Maintain the reservoir elevation no higher than elevation 3794 during December through March to reduce the potential for ice-jam flooding near the upper end of the reservoir.

All operations are closely coordinated with Montana Power Company to maximize all the benefits provided by Canyon Ferry and the seven downstream Montana Power Company powerplants.

Coordinate all flood control operations with the Corps.

Avoid dropping the reservoir below elevation 3774 to prevent exposing reservoir lakebed.

Figure V-3.—Canyon Ferry Reservoir operating criteria.

The top 3 feet of the reservoir's water storage, between elevations 3797 and 3800 feet (99,460 acre-feet), is allocated exclusively to flood control.[1] In addition, the next 27 feet of storage space, between elevations 3797 and 3770 feet (795,135 acre-feet), is joint-use[2] space available for both flood control and conservation purposes. The storage between elevations 3728 and 3770 feet (711,462 acre-feet) is active conservation.[3] The storage between elevations 3635.5 and 3728 feet (445,462 acre-feet) is dead and inactive.[4] (Figure V-4 shows Canyon Ferry reservoir allocations.)

At the end of each water year, Reclamation prepares an annual report summarizing climatic and hydrologic conditions and events of the past year that are principal factors governing the pattern of reservoir operations (figure V-5). Figure V-5a shows the reservoir level that could be expected at Canyon Ferry using operating criteria discussed in the previous pages and utilizing inflows that are equal to median inflows or flows that can be expected 50 percent of the time. Actual reservoir levels could vary widely from these shown depending on the runoff conditions and existing reservoir levels being experienced at that time. Figure V-5b shows the surface area that could be expected at Canyon Ferry using the operating criteria discussed on the preceding pages and utilizing inflows that are equal to median inflows or flows that can be expected to occur 50 percent of the time. The actual surface area of the reservoir could vary widely from these shown depending upon the runoff conditions and existing reservoir levels being experienced at that time. Annual operating plans are also prepared for the new water year. Except for special operations, the reservoir is generally managed under the following criteria and limitations:

R The top 3 feet, between elevations 3797 and 3800 feet, are used exclusively for downstream flood control. When storage rises into this pool, operation of the reservoir is directed by the Corps. This storage is generally evacuated as fast as downstream conditions permit.

[1] Flood control capacity is the reservoir capacity assigned for the sole purpose of regulating flood inflows to reduce downstream flood damage.

[2] Joint-use space is a portion of the total conservation capacity assigned to flood control purposes during certain periods of the year and to conservation during other periods of the year. Normally, these are established by a flood control agreement between Reclamation and the Corps, whereby Reclamation agrees to keep the joint-use pool available to control high runoff.

[3] Active conservation is the reservoir capacity assigned to regulate reservoir inflows for irrigation, power, municipal and industrial use, fish and wildlife, navigation, recreation, water quality, and other purposes. It does not include exclusive flood control or joint-use capacity.

[4] Inactive storage is the reservoir capacity, exclusive of and above the dead capacity, from which stored water is normally not available because of physical restrictions or operating agreements. Usually, inactive capacity is established for two purposes: (1) to provide minimum operating head on a powerplant and/or (2) to provide minimum head on canal or river outlets to maintain a desired discharge. Dead capacity is the reservoir capacity from which stored water cannot be evacuated by gravity.

CANYON FERRY RESERVOIR ALLOCATIONS

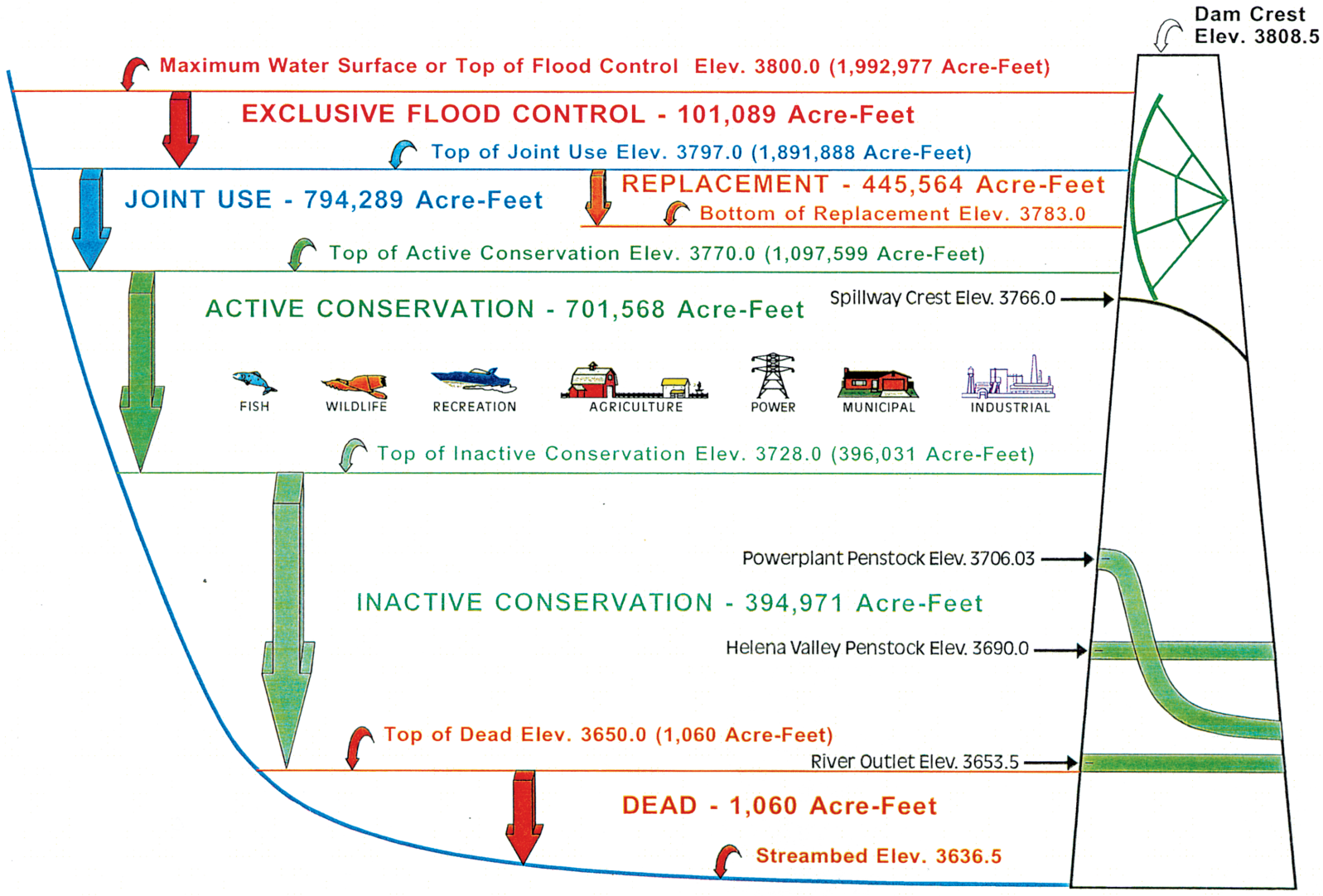


Figure V-4

CANYON FERRY RESERVOIR
Plans Based on 1967-1999 Historic Inflows
FIGURE V-5A

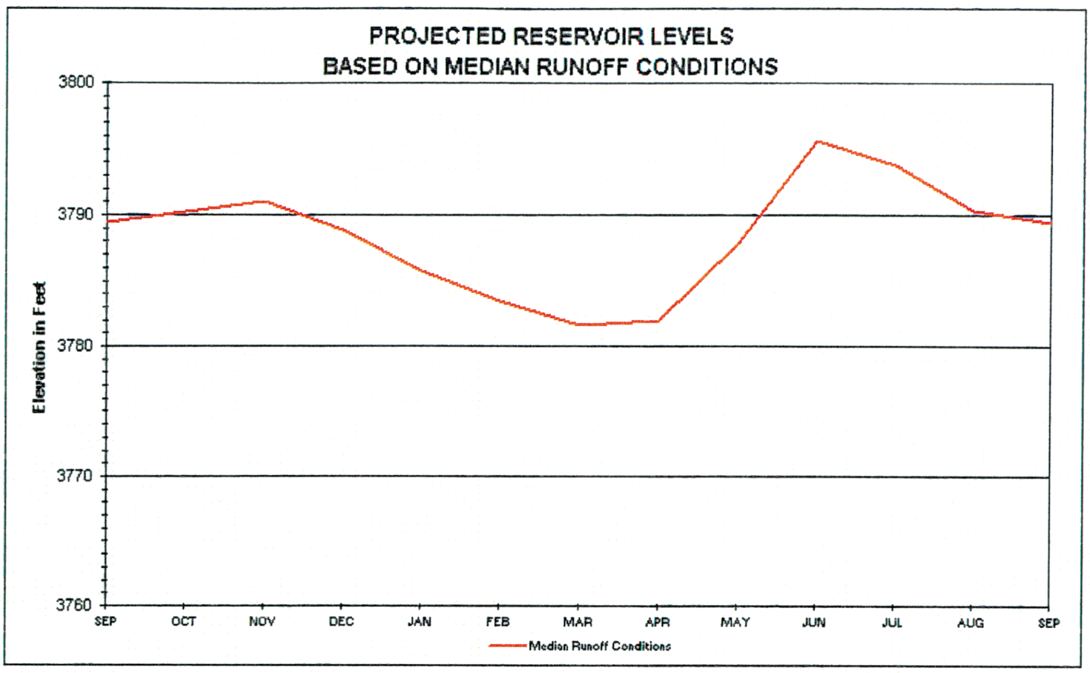


FIGURE V-5B

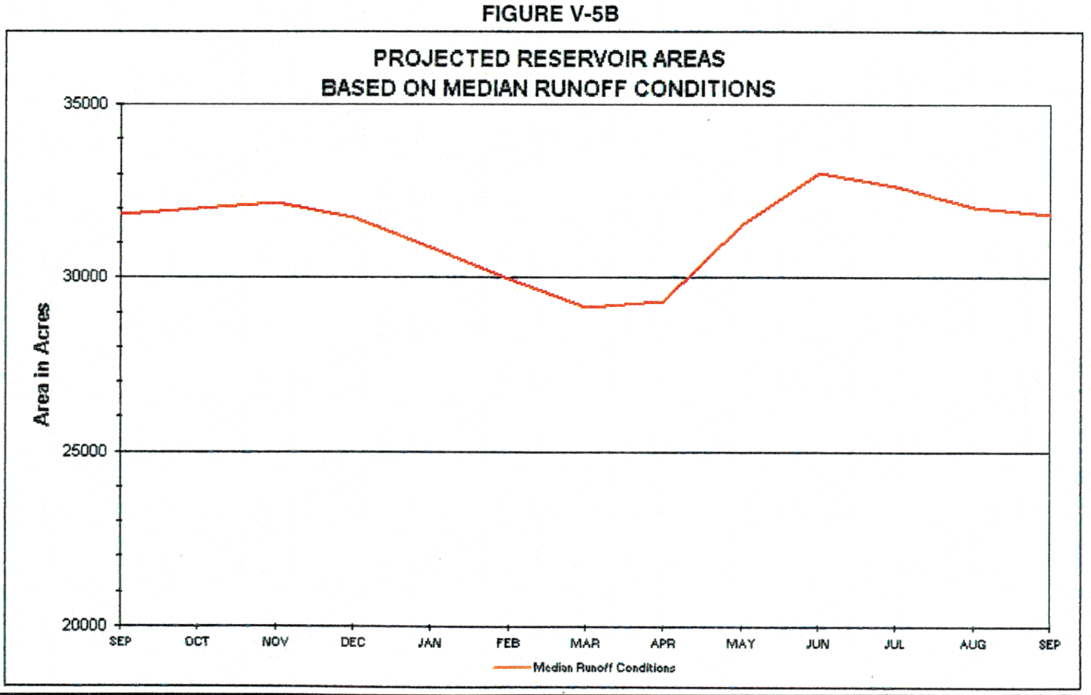


Figure V-5

R As soon as storage has peaked, usually in June or July, power releases are adjusted so that the pool will be drawn down to near elevation 3783 feet (1,510,000 acre-feet) by the following March 1. Each month, inflows to Canyon Ferry Reservoir are re-evaluated, and releases are adjusted accordingly. Releases to meet desired reservoir elevations are limited to powerplant capacity. Generally, water is not spilled to provide this drawdown.

R Most of the stored water that will be released from Hebgen Lake is spilled in October and November. Storage of this water in Canyon Ferry Reservoir may cause the reservoir to rise slightly in these months. However, PPL Montana will try to limit the Hebgen drawdown during these months in an effort to maintain the Canyon Ferry Reservoir pool below elevation 3794 feet after December 1 of each year. Storage below elevation 3794 feet, prior to winter freezeup, is desired to prevent ice-jam problems at the head of the reservoir.

R Beginning near the first of January, and at least monthly thereafter through June, water supply forecasts are prepared from snow cover and precipitation measurements to estimate the amount of spring runoff expected to flow into Canyon Ferry Reservoir. As these forecasts become available, operational mitigations are sometimes required. Releases are set, based on the most probable spring inflow forecast, to allow the reservoir to fill to the target elevation of 3797 feet (1,952,000 acre-feet) near the end of June.

R After April 1, if forecasts indicate that releases in excess of powerplant capacity must be made, the amount of spill is based on more refined inflow estimates. Releases are limited to 15,000 cfs as long as space is available.

R Depending on when the spring runoff starts, the release of water, based on inflow forecasts, may draw the pool as low as elevation 3770 feet (1,157,000 acre-feet). In a series of dry years, the pool may be drawn down as low as elevation 3728 feet (445,000 acre-feet) to meet firm power generation requirements and satisfy PPL Montana's prior rights. If storage is drawn down below elevation 3728 feet, the powerplant becomes inoperable.

R The runoff predictions take into account snowpack conditions and other variables. The Resource Management Plan/Environmental Assessment (RMP/EA) is not intended to address reservoir or powerplant operations issues. The discussion about operations in the RMP/EA describes the current operating criteria used at Canyon Ferry. The operating criteria are used as guidelines to balance water supply for all competing interests, including recreation.

In addition, input on reservoir operations is provided by recommendations from the Upper Missouri Advisory Council, a working group that is concerned with the effect that reservoir operation has on fish and wildlife resources, both within and below the reservoir. This group is coordinated by Montana Fish, Wildlife and Parks (MFWP) and includes representation from MFWP, anglers, marina operators, the Helena Valley Irrigation District, the Canyon Ferry Recreation Association (CFRA), Reclamation, PPL Montana, and outfitters. The council meets to discuss streamflow, reservoir levels, and fishery and wildlife management. The group monitors hydrologic and climatic conditions and makes recommendations on dam releases, particularly during spring and summer months when storage for power generation and irrigation may substantially affect downstream releases.

Environmental Consequences

Alternative A.—The hydrology would not be impacted under Alternative A.

Alternative B.—Same as Alternative A.

Alternative C.—Same as Alternative A.

Cumulative Impacts

No cumulative impacts have been identified under any of the alternatives.

Mitigation

No mitigation measures have been identified.

CLIMATE

Affected Environment

The climate of the study area is modified continental. It is influenced by Pacific Ocean air masses, drainage of cool air from the surrounding mountains, and protection by mountains in all directions. These modifiers make temperature changes less dramatic than those of a true continental climate.

The temperature in the area varies greatly from summer (average 66 degrees Fahrenheit [EF]) to winter (average 25 EF). The extreme temperatures are 106 EF to -36 EF. These extremes can have a big impact on reservoir facility use; there will be increased visitation in the summer and decreased visitation in the winter.

Precipitation can have an impact on visitation as well as the overall health of the habitat around the reservoir. Average precipitation is about 11 inches, with the extremes being from about 7 inches to about 20 inches. Most of the precipitation comes from March through August in the form of rain.

The temperature and precipitation data were found on the Western Regional Climate Center website.

According to the National Weather Service, the prevailing wind for the Helena Valley area (measured at the Helena airport) is from the west, with an annual average velocity of 9 to 13 miles per hour. This is considered highly representative of reservoir winds. Frequent storm fronts move along the slope of the mountains with high-velocity winds (20 to 35 miles per hour). These winds switch direction as storm fronts pass.

According to local residents and recreation managers, there are microclimates and weather phenomena that affect distinct portions of the study area. The northeast shore is more wind-prone, yet sunnier and less subject to snow accumulation than the west shore. Wind vulnerability has discouraged many of the northeast-shore residents from building boat docks. Snow and ice removal from roads is a greater problem on the west shore.

The south end of the reservoir has, in the past, been subject to severe duststorms caused by cultivation and lakebed exposure to drying during low-water flow periods. The dust has been reduced by dikes, built by Reclamation, that capture water to inundate the exposed lakebed. Some duststorms still occur, particularly during spring when winds are strong and cultivated fields are still devoid of vegetation. The south end of the reservoir is also subject to severe winter storms and ice accumulations partially because the water is shallow here. Managers reported that iceflows have sheared off dock poles. The south end's windier conditions are an attraction to more experienced sailors and windsurfers, but the wind causes management concern about providing safe mooring and water skiing docks.

Environmental Consequences

Alternative A.—The climate would not change under Alternative A.

Alternative B.—Same as Alternative A.

Alternative C.—Same as Alternative A.

Cumulative Impacts

No cumulative impacts have been identified under any of the alternatives.

Mitigation

No mitigation measures have been identified.

AIR QUALITY

Affected Environment

Air quality in the study area is assumed to be typical of background levels for western Montana. Although no monitoring was conducted during the course of this study, two environmental assessments, prepared within the local air basin, were reviewed. These documents addressed the Continental Indian Creek Lime Plant's operation, west of Townsend, and the Chartain Company's operation at Winston.

The studies documented that there were no major sources of air pollution in the northern portion of the study area. In the southern portion, the Continental Indian Creek Lime Plant contributes to the total suspended particulate (TSP) levels in the immediate study area. As part of their operating permit stipulation, the Continental Indian Creek Lime Plant submitted 4 years of TSP monitoring data, from 1981 through 1984. These data showed that, while there were particulate emissions, there were no violations of the Montana 24-hour standard.

Monitoring for the Chartain Project was conducted for a year (1986), both at the mine site and at the Highway 287 site near Winston. Monitoring results showed that TSP levels were well within State and Federal ambient air quality standards. Sample filters also showed low levels of heavy metals, such as arsenic and lead.

The ASARCO lead smelter in east Helena may contribute minor amounts of sulfur dioxide and particulate (metals or trace elements). However, the plant's distance from the study area lessens potential air quality impacts from this source.

Minor sources of air pollution in the study area include vehicular traffic, home heating, and mine exploration activities. On occasion, the east shore, in particular, is subject to duststorms because of the exposure of highly erodible soil to winds, especially in the spring. These exposed areas include roads and plowed fields.

By the mid-1960s, the frequency and magnitude of duststorms at the south end of the reservoir prompted Reclamation to consider construction of the now-flourishing wildlife ponds near Townsend. The exposure of flats in the delta area during low water periods, combined with high winds, subjected Townsend area residents to health risks and reduced visibility from duststorms. The State Air Quality Bureau no longer receives complaints about dust from this area.

Magnesium chloride was applied to the road surfaces within the recreation sites and on access roads adjacent to the recreation areas before 1994 and on selected roads during the fires of 2000. Magnesium chloride reduces dust by holding moisture on the road surface.

Environmental Consequences

Alternative A.—Air quality would not change under Alternative A.

Alternative B.—Additional O&M of access roads would slightly improve air quality as compared to Alternative A. However, any improvement in air quality from additional O&M of roads may be offset by increased vehicle pollution, campfires, etc.

Alternative C.—Additional O&M and paving some roads would improve the air quality beyond what would be anticipated under Alternative B.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

No mitigation measures have been identified.

WATER QUALITY

Affected Environment

This section of the report provides an overview of the groundwater and surface water resources of Canyon Ferry Reservoir and the Missouri River reach above the reservoir. Water quality

studies conducted by Reclamation and the Montana Science Institute are briefly discussed. This section concludes with a short synopsis of some of the current initiatives relating to water quality in the reservoir area.

Groundwater.—A large, confined aquifer composed of Quaternary and Tertiary deposits underlies the Townsend Valley and supplies water drawn principally for domestic and irrigation use. Deep percolation from rainfall and snowmelt recharges the aquifer in the mountain ranges bordering the valley, while perennial streams, irrigation canals and laterals, and seepage from irrigation water recharge groundwater in the valley.

Well record data available from the Montana Department of Environmental Quality (DEQ), show that wells on the east shore serving the cabin sites are generally 100 feet deep or less. Yields of these wells generally range from 10 to 40 gallons per minute. On the bench farther to the east, well depths are much greater, up to 400 feet. On the west shore, drill logs show that well depths range from 100 to 400 feet, and yields are between 10 and 45 gallons per minute. Well depths in the vicinity of the recreation sites are generally less than 100 feet, except for Hellgate, where two wells exceed 100 feet. At least two additional wells have been drilled on the east shore at depths of 490 and 500 feet, which yield as little as 2 gallons per minute.

Water quality records for recreation areas around the reservoir include information for Silos, White Earth, Lewis and Clark, Jo Bonner, Riverside, Ponderosa, Hellgate, Indian Road, Chinamen's, and Court Sheriff Recreation Areas, and the Canyon Ferry shop building. These wells are considered noncommunity, public water supplies and are required to be tested monthly for bacterial contamination. Currently, wells are sampled monthly by Reclamation personnel, but only when the facilities are open to the public (typically mid-May to early September). Over the period of record, various wells at the recreation sites have shown occasional evidence of high levels of coliform bacteria. The problem has been remedied either by disinfecting (chlorinating) or shutting down the affected well. At present, State law requires abandoning a well if the well is unused.

Two groundwater quality concerns related to septic system failure have been identified by the Lewis and Clark County Health Department. First, it is conjectured that fractured bedrock, in combination with shallow soils on the west shore, form a ready conduit between septic tank drain fields and groundwater supplies. This has lead the health department to require some cabin site lessees to install holding tanks for on-site sewage disposal. The pumped contents are periodically transported to the city of Helena sewage treatment system for disposal. Second, there is concern that the density of development and the trend toward year-round occupation of the cabin sites, especially on the east shore, may eventually degrade groundwater quality because of malfunctioning septic tank drain fields. The cabin sites are small—having been created before State law required a 1-acre minimum lot size for having both a septic tank and a

well—and the small size may preclude adequate treatment or replacement of drain fields. Health department staff believe that work should commence immediately on a long-range master plan for replacing individual on-site septic systems with alternative processes.

Surface Water.—The Missouri River drains 15,904 square miles of land above Canyon Ferry Reservoir, and the drainage area above the Toston gaging station is about 14,699 square miles. The annual inflow, measured at the Toston gaging station, upstream from the reservoir, averaged about 3.8 million acre-feet from 1942 through 1997, but the average annual computed inflow into Canyon Ferry Reservoir is about 3.9 million acre-feet. Annual volumes have ranged from a minimum of 2.4 million acre-feet in 1989 to a maximum of 5.8 million acre-feet in 1997.

The Missouri River is the primary source of inflow to the reservoir. Eleven perennial streams also feed the reservoir. In the spring and summer months, however, much of the water in these creeks is diverted for irrigation, and only a small amount of water reaches the reservoir from these sources. Some inflow to the reservoir is contributed from gravel aquifers beneath the reservoir, but the amount of inflow is unknown.

Water quality in the reservoir is generally suitable for propagation of cold-water fish, safe for water sports, and potable after filtration and treatment. Historical water quality data for the Missouri River, recorded at the Toston gaging station, show that the water flowing into the reservoir is a productive, calcium-bicarbonate type; hard and nutrient rich; and has a high phosphorous level. The pH, dissolved oxygen content, and water temperature produce conditions amenable to cold-water fisheries. Salinity is low and, aside from arsenic, heavy metals are not a concern because of their low concentration and the high alkalinity of the reservoir water (a neutralizer) (U.S. Department of the Interior, various dates).

Phosphorous and arsenic, both of which occur naturally, are two primary contaminants in Canyon Ferry. Phosphorous enters the reservoir largely from natural sources in the Missouri River Basin; soil and water in southwest Montana are particularly rich in this nutrient. Although this natural fertility sets the stage for blue ribbon trout streams, it also contributes significantly to the nutrient load in Canyon Ferry Reservoir. The combination of phosphorous and nitrogen with hot, dry, still conditions in summer months has served to promote algal blooms in the reservoir, some of them toxic.

A toxic blue-green algal bloom in 1984 first focused public attention on the reservoir's water quality and signaled the need for a closer assessment of potential sources of reservoir contamination. In a 1986 investigation by the Montana State University Water Resources Center at Bozeman, Montana, it was found that the same blue-green algae species have been present at about the same levels and seasonal periods since the reservoir was filled. Blue-green algal dominance in the reservoir is attributed to high natural phosphorus concentrations, a low nitrogen-to-phosphorous ratio (caused, in part, by the deep-water discharge of nitrogen via the

dam), and warm, still water conditions. Aside from periodic decreases in esthetics along the shoreline, the major water quality problem caused by the algae is its periodic toxicity (for further discussion, see "Health Considerations" in the "Land Use" section).

Arsenic is carried to the Missouri River via the Madison River, a tributary that receives large volumes of arsenic-bearing thermal water from Yellowstone National Park. Arsenic is a semi-metal known for its poisonous, acute, and chronic health effects in humans; it is also a carcinogen. Long-term contact or ingestion of untreated water could pose a hazard for human health, possibly an increase in cancer risk. Total recoverable arsenic concentrations measured in the Missouri River near Toston have typically ranged from 10 to 50 micrograms per liter (µg/L)[5], exceeding the State's ambient water standard for human health of 20 µg/L approximately half the time but below the State's maximum acute arsenic level of 340 µg/L and maximum chronic level of 150 µg/L for aquatic life.[6] Typical background levels for arsenic in stream water are 2 to 5 µg/L. In the reservoir, arsenic averaged over 20 µg/L at several stations sampled from 1997 through 1998 (Horn and Boehmke, 1998). In the Missouri River, below Canyon Ferry Dam, arsenic concentrations have ranged from 20 to 35 µg/L.

In 1998, the State of Montana listed Canyon Ferry Reservoir, and the Missouri River above it, as water quality impaired stream reaches under Section 303(d) of the Federal Clean Water Act. Noxious aquatic plants, nutrients, and pathogens were identified as water quality parameters of concern for the reservoir. Streamflow alteration, metals, nutrients, and suspended solids were designated as parameters of concern for the Missouri River above Canyon Ferry. Several tributaries draining directly into the reservoir were also listed as impaired, including Boulder Creek, White Gulch Creek, Avalanche Creek, Hellgate Gulch, Magpie Creek, and Beaver Creek.
Designating a water body as impaired requires the State to set a priority for determining the total maximum daily load (TMDL) of a pollutant that the water body can receive and still meet water quality standards set for the designated uses of the water body. The State has set a low priority for developing TMDLs for Canyon Ferry and tributary stream reaches but will be developing a comprehensive program for the prevention, abatement, and control of water pollution, as mandated under the Federal Clean Water Act and the Montana Water Quality Act.

Special Water Quality Studies.—In 1991-93, Reclamation studied the fate and transport of arsenic in the Madison and Upper Missouri River Basins (Reclamation, 1994). Arsenic concentrations were measured in main channels, irrigation diversion canals, irrigation return flows, shallow groundwater zones, and various soil types. Study results indicated that soils in the investigation area retained (adsorbed) most of the arsenic from Missouri River water used

[5] Median dissolved arsenic level at Toston for 1980-95 was 28 µg/L (U.S. Geological Survey data).
[6] WQB-7, Montana Numeric Water Quality Standards. The State of Montana water quality standard for aquatic life defines a maximum acute arsenic level of 340 µg/L and a maximum chronic level of 150 µg/L.

for irrigation. Moreover, because there was no apparent significant buildup of arsenic in the soils, it was concluded that arsenic was being removed from the soils by volatilization or plant uptake.

As part of the study, eight wells were sampled in the Toston to Townsend area. Six of the eight wells had arsenic concentrations of 3 µg/L or less. The other two wells had arsenic concentrations of 17 and 18 µg/L. With an average arsenic concentration of 30 µg/L in the Missouri River at Toston, it was concluded that irrigation return flows from Missouri River diversions apparently were not significantly impacting arsenic levels in groundwater in the vicinity of the sampled wells.

An additional product of the study was the development of a conservative, monthly, time-step water quality model that could be run to determine arsenic concentrations in the Madison and Upper Missouri Rivers, including Canyon Ferry Reservoir. Because of the large time-step increment (1 month) used in the model, it is limited in its ability to simulate arsenic levels in situ. The model is better suited to evaluating impacts caused by different hydrologic operation schemes for Canyon Ferry Reservoir.

In 1997, Reclamation initiated a water quality monitoring program on Canyon Ferry Reservoir. Sample data collected from various sites around the reservoir were compared to historical data to determine if ecological conditions in the reservoir had changed over time. Results of that study (Horn and Boehmke, 1998) showed that:

- **R** Canyon Ferry receives a high nutrient load, in particular phosphorus, which results in an extremely productive reservoir. Almost every year, nutrient loading leads to large, blue-green algal blooms. It appears that no significant changes in productivity have occurred since reservoir impoundment.

- **R** Deep reservoir withdrawals by the power penstocks limit the buildup of nutrients. The deep withdrawals, however, also result in low dissolved oxygen releases, which could adversely impact downstream fisheries. Historical data indicate that low dissolved oxygen levels in releases are common; however, in more recent years, the problem has become worse.

- **R** Arsenic levels in the reservoir are high, but not significantly different from the expected range for the area. Arsenic concentrations in water samples averaged greater than 20 µg/L. Mercury levels were not high in sediments or water. There was no significant contamination from pesticides. Oil and gas contamination from marinas was nondetectable. Bacterial problems were minimal. There were no obvious adverse impacts from septic releases during the period of study.

Low dissolved oxygen, 4 to 5 milligrams per liter (mg/L), has been identified in the stretch of the Missouri River between Canyon Ferry Dam and Hauser Reservoir. These conditions begin

in mid to late August and remain below 6 mg/L for about 90 days. A study was initiated in 1999 to identify low dissolved oxygen locations and methods which can be employed to raise the oxygen level downstream from Canyon Ferry Dam. An additional study was completed in September 2000 to determine if spillway releases change the dissolved oxygen levels. A study has been initiated to determine if turbine(s) can be modified to increase the dissolved oxygen levels. These methods may be operational or mechanical.

For the past decade, the Montana Science Institute has collected water quality data in the study area. Their findings show that the extensive drainage area of the Missouri River above the reservoir greatly increases the likelihood that agricultural contaminants will enter the reservoir.

With this in mind, the Lake and Stream Subcommittee of the Headwaters Resource Conservation and Development District recently voted to cease using herbicides to control weeds on canals and ditches associated with the reservoir.

Aware that shellfish are known to concentrate heavy metals in their body parts, in 1990 the Montana Science Institute investigated the concentrations of arsenic in crayfish inhabiting the reservoir. For the samples tested, the study showed that the concentration of arsenic in crayfish was 41.9 times greater than the water from which they were taken. While this data signaled a possible health concern, authors of the study acknowledged the need for further study, not only of crayfish, but of other species in the food chain. The institute continues to monitor arsenic at four sites along the Missouri River, above and below the dam.

Current Conditions and Programs in Place.—Apart from arsenic and nutrients, a variety of other pollutants may be reaching the reservoir, but their sources and quantities are unknown.

Compliance with State and Federal environmental regulations resulted in significant changes in the 1990s regarding underground storage tanks (USTs). The USTs at Kim's Marina were replaced in 1993 with a new system to meet State and Federal standards (effective December 1998). Yacht Basin Marina replaced the UST with an aboveground storage tank (AST). The UST at Goose Bay Marina has been removed and will likely also be replaced by an AST.

In 1990, Reclamation removed 20 USTs in the Canyon Ferry Government Camp and one in Broadwater County. Most of these were for heating oil, but two were for gasoline. The gasoline tanks were replaced with a concrete-encased AST.

A number of USTs and ASTs have been removed within the cabin site areas to comply with either environmental regulations and/or fire code. Montana DEQ requires soil sampling to ensure any contamination from leaking USTs is remediated. In-service USTs for home heating oil are now exempt (since 1998) from the Montana UST regulations. However, fire code requires removal of out-of-service USTs.

Because of steep slopes, excessively permeable soils, and shallow depth to bedrock, the Lewis and Clark County Health Department is requiring sewage holding tanks instead of drain fields on what is anticipated to be approximately 28 west-shore sites. On the east shore, holding tanks may be required on about 10 sites because of impermeable soils, short distances to surface water, and potential well contamination. Holding tanks are allowed only by variance, only on existing sites where there are physical limitations that prevent alternative measures, and only where occupancy is limited to 120 days a year. To monitor the condition of the tanks, owners are required to submit pumping records to the health department. If these records are not received on an annual basis, the owner is required to allow tank pumping tests by the health department. Potential ingestion or contact with untreated waste water is a primary concern of the health department.

There are several ongoing county, State, Federal, and State-administered initiatives that will serve to protect and enhance water quality, both in the reservoir and in the local aquifers. At the county level, Article 12 of the cabin site leasing permits issued by Reclamation provides that, "All cabin site septic systems must be inspected by the Lewis and Clark County Health Department to ensure that applicable waste water disposal standards are being met and to ensure that untreated effluent is not seeping into the reservoir." Article 12 goes on to state that, "After September 1, 2000, no cabin site permit will be approved for renewal unless an approved waste water system is in operation." To meet the requirements of Article 12 of the permit and to facilitate the sale of the cabin sites, as required by the Canyon Ferry Reservoir, Montana Act (November 29, 1999), Reclamation has allowed the use of additional Reclamation lands for a waste water treatment system where no on-site option is available. These additional lands will become part of the sale of the cabin sites.

At the State level, several programs support the preservation and improvement of water quality in Montana. House Bill 546, passed by the 1997 State legislature, established a TMDL program for Montana. Under the TMDL program (specifically Section 75-5-703(8) of the Montana Codes Annotated), the Montana DEQ is called upon to "support a voluntary program of reasonable land, soil, and water conservation practices to achieve compliance with water quality standards for nonpoint source activities for water bodies that are subject to a TMDL. . ." Through the
319 Grant Program of the Federal Clean Water Act, the Montana DEQ is able to fund watershed projects that address water quality and TMDL development.

Additionally, the permitting division of the Montana DEQ is charged with conducting plan reviews of wells and associated facilities for public drinking water supply and facilities for waste disposal. Under the plan review process, new campground and concessionaire facilities, or modifications to existing facilities in the Canyon Ferry management area, would be checked for compliance with minimum design standards that are set by the State. Before issuing an approval or a permit for a proposed new or expanded wastewater system (as required by the Montana Water Act), the Montana DEQ must perform a nondegradation analysis to ensure that unacceptable degradation of surface water or groundwater will not occur. Within the next 3 years, Montana DEQ will be delineating source water protection areas. Pursuant to the

Federal Safe Drinking Water Act, each of these public drinking water sources shall be delineated. Typically, the protection area is the land area overlying the capture zone of the well that extends a distance based on a 3-year time of travel or 1,000 feet (the greater of). The surface water intake will have a "spill response region" delineated that extends 1,000 feet into the lake from the intake at the dam and ½ mile in an upland direction. The purpose of the delineation is to identify areas where spills, leaks, discharges, or other man-induced events could likely impact the drinking water source. (Table V-1 shows locations of existing well sites on Reclamation lands.) These source water protection areas should be designated as environmentally sensitive to protect water quality.

Table V-1.—Location of well sites on Reclamation lands

Name	Public water supply identification number	Source type and number	Notes
Canyon Ferry Village	00243	Groundwater	
Riverside	42941	– 1	
Kim's Marina	02857	Groundwater – 1	
Court Sheriff	41439	Groundwater – 1	
Chinamen's	51443	Groundwater – 1	
Jo Bonner	41438	Groundwater – 1	
Hellgate	41445	Groundwater – 1	
Goose Bay	00967	Groundwater – 1	
Yacht Basin	00427	Groundwater – 1	
White Earth	42421	Groundwater – 1	
Silos	40963	Groundwater – 1	
Indian Road	42422	Groundwater – 1	
Montana Science	03923	Groundwater – 1	Currently inactive
Institute	00241	Groundwater	
City of Helena		! 2	
		Surface water	

At the Federal level, the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), is currently assessing water quality and quantity and related riparian issues in the Beaver/Pole/Staubach drainage. In conjunction with the 1985 Food Security Act, the agency continues its work with local area operators to improve management of crop residues, irrigation water, nutrients, and pesticides.

Two water quality monitoring programs are currently in place in the vicinity of Canyon Ferry Reservoir. PPL Montana samples the Missouri River at the old Toston Bridge at Toston (upstream from the reservoir) as well as reservoir discharge. Sampling is conducted quarterly at both sites for an array of chemical and physical water quality parameters, including cations and anions, nutrients (total and dissolved), low level total and dissolved arsenic, dissolved oxygen, pH, temperature, and specific conductivity. Plans are to continue quarterly sampling for approximately 4 years and revert to monthly sampling for the succeeding 3 years. The

Montana DEQ has a joint water sampling program in place with the U.S. Geological Survey (USGS). Quarterly samples are taken at the USGS Toston gauge (Station No. 06054500) for total suspended solids, nutrients, metals, and biological constituents. Future plans are to sample sediments for metals analysis and, possibly, to collect macroinvertebrates, algae, and chlorophyll samples. USGS has a real-time recorder for water temperature and river stage at this site.

Reclamation, Technical Service Center, published a report in December 1998 entitled, *The Limnology of Canyon Ferry Reservoir, Montana,* that analyzed data collected in 1997 and 1998. Water quality data collected during this period included nitrates, phosphorous, ammonia, nitrogen, orthophophates, zooplankton, phytoplankton, chlorophyl, coliform bacteria, pesticides, petroleum residues, arsenic, and mercury. Water column profiles were completed to sample pH, conductivity, dissolved oxygen, and water temperature. The report found the reservoir to be a nitrogen-limited eutrophic system which would allow algal blooms to occur, dominated by the nitrogen fixing blue-green algae. Levels of coliform bacteria were below Environmental Protection Agency (EPA) requirements for body contact averaging 22/100 milliliters. Water samples for pesticides were found to contain no target analytes at a detection limit of 1 part per billion (ppb). Analysis for petroleum products showed no detectable presence at the detection level of 1 milligram per liter. Arsenic levels were relatively high, averaging greater than 20 ppb. Although high, this is not significantly different from values expected for the area. Mercury samples were below detectable limits.

An additional report will be published by the Technical Service Center in December 2001 which will cover data collected from 1999 through 2001. This report will cover data collected on nutrient samples, zooplankton, phytoplankton, chlorophyl, water column profiles, as well as hydroacoustic samples to determine fish numbers and sizes.

Environmental Consequences

Alternative A.—As a result of the ongoing cabin site septic system inspection and permitting program being implemented by the Lewis and Clark County Health Department, reservoir water quality and shoreline groundwater quality would remain unchanged or be improved under this alternative. The two primary contaminants in the reservoir, phosphorus and arsenic,
will not be affected. The high nutrient load entering the reservoir will continue to spawn algal blooms during hot, dry, still conditions in the summer. Some of the blooms might be toxic. Dissolved oxygen levels in reservoir releases will continue to be low until the analysis is complete and recommended actions are implemented. Increased visitation and year-round occupation of the cabin sites will escalate the potential for pollution from motorboat fuels, runoff from roads and parking areas, and disposal of unregulated substances in the reservoir. Ongoing programs administered by State and Federal agencies and initiatives undertaken by other groups and associations will improve water quality. Water use for domestic and recreational purposes and landscape irrigation would increase slightly under this alternative.

Alternative B.—Nutrient loading, elevated arsenic levels, low dissolved oxygen discharges, and the occurrence of algal blooms historically associated with the reservoir would continue. Low dissolved oxygen discharges would occur until the analysis is complete and the recommendations are implemented. Potential adverse impacts from septic releases would be curtailed. Water quality monitoring initiatives under the "Water Quality Monitoring Program" and "Pollution Control" alternative elements would provide a safety net to detect isolated contaminant events and adverse water quality trends.

Under the "Health and Safety" and "Water Quality Monitoring Program" alternative elements, water quality would be protected by:

- **R** Requiring all future concessionaires to install recreational vehicle (RV) dump stations
- **R** Adding sanitation facilities and trash receptacles
- **R** Ensuring fueling facilities meet EPA standards

Water use for domestic, recreational, and landscape irrigation purposes would increase slightly under this alternative.

Alternative C.—Impacts would be the same as under Alternative B.

Cumulative Impacts

There would be no cumulative impacts resulting from implementation of any of the alternatives. Pollution prevention initiatives under the action alternatives would safeguard water quality under enhanced recreation scenarios.

Mitigation

There are no negative impacts associated with any of the alternatives, and no mitigating measures would be required.

GEOLOGY

Affected Environment

Area Geology.—Canyon Ferry Dam is located on the main stem of the Missouri River, about 58 miles north of the confluence of the Jefferson, Madison, and Gallatin Rivers that form the

Missouri River. Helena, the capitol of Montana, lies 17 miles southwest of the dam site. The Canyon Ferry Unit, which includes the dam, Canyon Ferry Reservoir behind the dam, and the surrounding land administered by Reclamation, occupies a portion of the intermountain basin known as Townsend Basin, a northwest-southeast-trending valley between the Big Belt and Elkhorn Mountains (see figure V-8). These mountains are considered to be subsidiary ranges of the Rocky Mountains.

The extreme northeastern shore of the reservoir in the vicinity of the dam abuts the west flank of the Big Belt Mountains. The oldest exposed rocks are the pre-Cambrian sedimentary formations of the Big Belt Series. The remainder of the eastern shore, which extends south to the reservoir terminus at the town of Townsend, occupies coalescing alluvial fans that rise gently eastward to their source in the Big Belt Mountains. The northwestern shore of the reservoir, from the dam site approximately to the Lewis and Clark/Broadwater County line, lies along a complexly faulted, synclinal structure known as the Spokane Hills. This merges with the east flank of the range of mountains known as the Casey Peaks or Elkhorn Range. Numerous large, granitic rock outcrops are in this section.

The Townsend Basin lies in a structural depression formed by the down warping of pre-Cambrian and Cambrian sedimentary formations. These ancient sedimentary rocks have been intruded by masses of granitic rocks. The basin is partially filled with water-lain Tertiary volcanics and Quaternary alluvium.

The geology of the land bordering Canyon Ferry Reservoir is shown in figure V-6. As seen in this figure, four major geological units are found in the area: Tertiary lake beds, igneous formations, Quaternary alluvium, and sedimentary formations. The characteristics of these units are detailed below.

Tertiary Lakebeds.—Tertiary lakebed deposits cover most of the northeast and southwest portions of the Canyon Ferry area. These deposits overlie eroded surfaces of folded and faulted older rocks and underlie most of the younger sediments in the Townsend Valley. Tertiary lakebed deposits have been identified mostly on the gently sloping plains, characteristic of the eastern shore below the Big Belt Mountains, and the western shore below the Spokane Hills and Elkhorn Mountains. They range in thickness from 4,000 to 6,000 feet.

Tertiary lakebed deposits offer a variety of appearances. East of the Spokane Hills, the Tertiary deposits are composed of conglomerates interbedded with red shales and some bentonitic materials. Southwest of the Big Belt Mountains, Tertiary deposits are composed of reworked tuffaceous material without bentonite. Tertiary deposits of Miocene age, which are poorly exposed in bluffs between Confederate Gulch and Canyon Ferry Reservoir, are light buff sandy clay and sand and gravel beds overlain by conglomerate.

Canyon Ferry Reservoir

General Geology

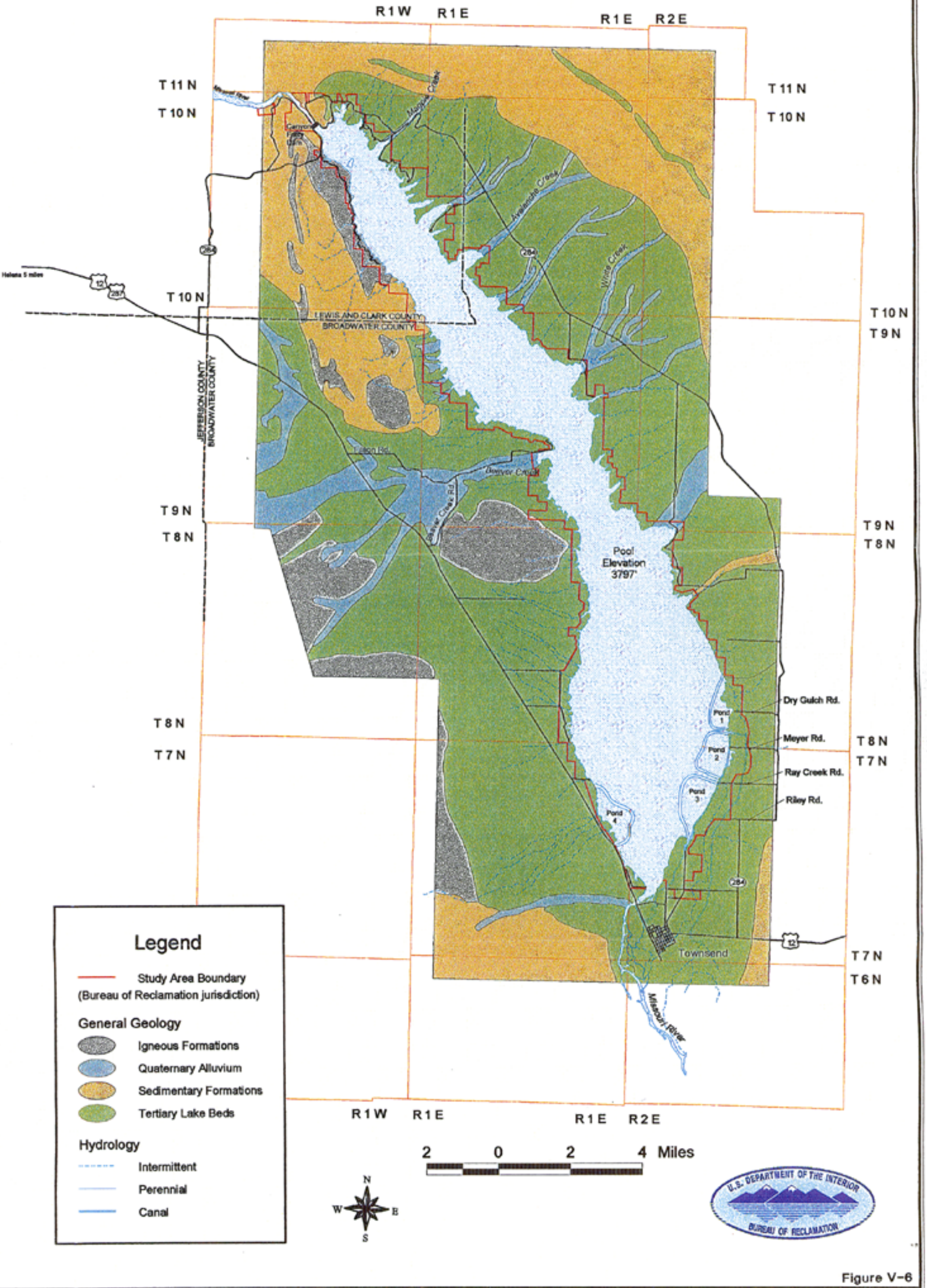


Figure V-6

Igneous Formations.—Igneous rocks intrude the sedimentary deposits in the Townsend Valley as dikes, stocks, sills, and small plugs. Outcrops have been identified on the west shoreline from Yacht Basin to Crittendon Recreation Area. For the most part, however, igneous rocks intrude as relatively thin sills between beds of other rock. Although classified as five principal types, the igneous rocks are basically fine- to coarse-textured rocks consisting of different mineral mixtures.

Quaternary Alluvium.—Alluvium of Quaternary age is found in the bottom land of the southeastern part of the reservoir, in drainageways on the eastern shore of the reservoir, and in gently sloping drainageways on the western shore of the reservoir. Alluvium deposits on folded and eroded surfaces of Tertiary and older rocks are composed of granite, quartzite cobbles, sand, silt, and gumbo clay or bentonite not more than 60 feet thick. Thicker and coarser textured alluvium is found near the mountains, whereas thinner and finer textured material may be found toward the valley.

Sedimentary Formations.—Sedimentary rocks comprise the oldest rocks in the Big Belt Mountains and Spokane Hills. These rocks formed from mud and sand that lay at the bottom of a sea that covered this area more than 1 billion years ago. Younger sedimentary rocks composed of sandstone, limestone, and shale overlie the older strata.

Environmental Consequences

Alternative A.—Except for possible disturbance from site leveling or road construction and the lost opportunity to provide the public with a worthwhile educational experience, geology in the study area would remain unchanged.

Alternative B.—Except for possible disturbance from earth-moving activity, study area geology would not be impacted. The interpretive geology program component of this alternative might identify certain geologic features worthy of protection from site construction activity.

Alternative C.—Impacts would be the same as under Alternative B.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

There are no mitigating actions under any of the alternatives.

SOILS AND TOPOGRAPHY

Affected Environment

Information used to develop this section of the report was obtained from the USDA, NRCS (formerly the Soil Conservation Service). At the time of this printing, the soil survey of Lewis and Clark County was unpublished, and information for study area soils located in the county was obtained verbally and in draft manuscript from the NRCS Helena, Montana, field office.

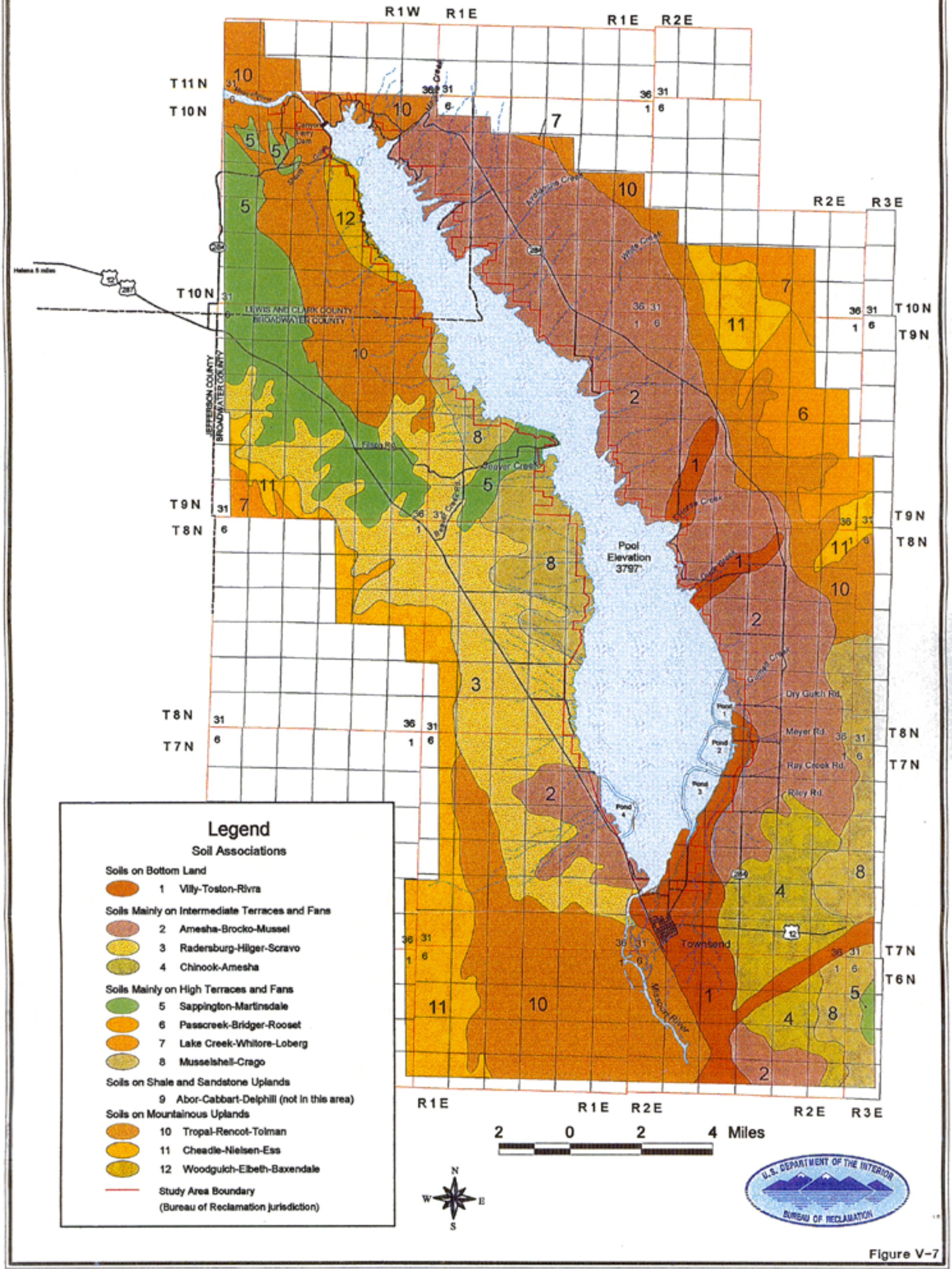
The soil survey of Broadwater County, on the other hand, was complete, and soil information for that portion of the study area in Broadwater County was obtained from *Soil Survey of Broadwater County Area, Montana* (Soil Conservation Service, April 1977). The reader is encouraged to investigate these sources if supplemental information is needed.

Soils.—An overview of the soils in the study area is depicted in figure V-7. This figure shows the location of soil associations in the study area and adjoining land as configured by the NRCS. A soil association is a landscape that has a distinctive proportional pattern of soils. Each association normally consists of one or more major soils and at least one minor soil and is named for the major soil(s). Any particular soil may be found in more than one soil association.

Soils within an association share a common landscape position and type of parent material and, thus, a common management capability. For this reason, a soil association map is useful as a general guide for managing a watershed or wildlife area and in planning engineering structures, recreational facilities, and community developments. Because soils within an association may differ in slope, depth, stoniness, drainage, and other characteristics that affect their management, a soil association map is not well suited for site-specific planning.

Figure V-7 shows 12 soil associations within the study area vicinity. Of the 12 associations, 7 impinge directly on the Canyon Ferry management area. For interpretive purposes, the soil associations in the descriptive legend in figure V-7 are divided into five general landscape positions (i.e., soils on bottom lands, soils mainly on intermediate terraces and fans, soils mainly on high terraces and fans, soils on shale and sandstone uplands, and soils on mountainous uplands). Interestingly, because the study area is so narrow, the predominant soils in several areas are actually minor components of the parent soil association and,

Canyon Ferry Reservoir
Soil Associations



Legend

Soil Associations

Soils on Bottom Land

1 Villy-Toston-Rivra

Soils Mainly on Intermediate Terraces and Fans

2 Amesha-Brocko-Mussel

3 Radersburg-Hilger-Scravo

4 Chinook-Amesha

Soils Mainly on High Terraces and Fans

5 Sappington-Martinsdale

6 Passcreek-Bridger-Rooset

7 Lake Creek-Whitlore-Loberg

8 Musselshell-Crago

Soils on Shale and Sandstone Uplands

9 Abor-Cabbart-Delphill (not in this area)

Soils on Mountainous Uplands

10 Tropal-Rencot-Tolman

11 Cheadle-Nielsen-Ess

12 Woodgulch-Elbeth-Baxendale

Study Area Boundary
(Bureau of Reclamation jurisdiction)

Figure V-7

consequently, not included in the association name. In the narrative that follows, the soil associations located in the management area are described as they occur sequentially around the reservoir in a clockwise direction starting at the north end.

The Tropal-Rencot-Tolman association (No. 10 in figure V-7) caps the north end of the reservoir and extends to the Magpie Creek drainage on the east shore. The soils in this association were formed in material weathered from limestone alluvium (water transported material); argellite, granite, or igneous bedrock or colluvium (material that has moved downslope); or semi-consolidated loamy sedimentary beds. The soils are loam, gravelly loam, and stony loam, gently sloping to very steeply sloping soils on mountainous uplands that range from shallow to very deep and well drained to somewhat excessively drained. The association is dissected by a branching pattern of smooth, grassed drainageways. Areas of rock outcrop are common. Soil units on steeper slopes in this area include the Crago-Musselshell gravelly loams, Delpoint Cabbart loams, Hauz-Sieben-Tolman channery loams, Castner-Holter-Rock outcrop, and Woodgulch-Elbeth-Rock outcrop. These soils are minor components of the soil association and, thus, not included in the association name. Runoff is very rapid on the Castner-Holter-Rock outcrop unit and rapid on the balance of the soils. The hazard of wind blowing is slight on the Woodgulch-Elbeth-Rock outcrop soils; moderate on the Delpoint Cabbart, Hauz-Sieben-Tolman, and Castner-Holter-Rock outcrop units; and severe on the Crago-Musselshell gravelly loams. Gently sloping to sloping landscapes are occupied principally by the Musselshell-Crago complex. These soils are minor components of the soil association and, thus, not included in the association name. Runoff is slow on these soils, and the hazard of soil blowing is severe. Campgrounds in the area, including Jo Bonner, Cave Bay, Court Sheriff, Shannon, Chinamen's Gulch, and Sandy Beach, are located on toe slopes or alluvial terraces.

From the Magpie Creek drainage south along the east shore of the reservoir to the Gurnett Creek drainage, the study area lands are occupied by the Amesha-Brocko-Mussel association (No. 2 in figure V-7). This association is crossed by two lobes of the Villy-Toston-Rivra association (No. 1 in figure V-7), where Horse Creek and Duck Creek enter the reservoir. Amesha loam and cobbly sandy loam soils and Scravo cobbly loam soil (a minor, un-named component of the association) occupy the fan and terrace positions that slope gently westward toward the reservoir in this area. Amesha soils consist of deep, well-drained soils formed in strongly calcareous, stratified alluvium. Permeability is moderate, and runoff is medium to slow. Where the surface soil is loam or silt loam, the hazard of soil blowing is rated as severe; otherwise, it is moderate. From sheet 10 of the soil survey report, Confederate Campground lies on the very edge of a neck of Amesha soil. Scravo soil differs from the more extensive Amesha soil in that it is somewhat excessively drained, more gravelly, and the hazard of erosion is only slight. As depicted on sheet 5 of the soil survey report, the Goose Bay Campground appears to be located on a narrow band of Scravo cobbly loam soil on the north shore of the bay. Amesha soils are used for dryland winter wheat, some irrigated cropping, and range. Scravo soils are used mostly for range. Typically, the Amesha soils transition to the steeply sloping Musselshell-Crago channery loam soils (another minor, un-named component

of the soil association) on terrace edges along the reservoir shore. In this landscape position, runoff is rapid, and the hazard of erosion is severe. From unpublished soil map information received from the NRCS, it would appear that Hellgate Campground is located on this soil unit.

As mentioned, the Villy-Toston-Rivra association (No. 1 in figure V-7) occupies the small area of land where Horse Creek and Duck Creek enter the reservoir. The main extent of the association, however, lies just south of Gurnett Creek and extends to the east bank of the Missouri River at the southern terminus of the reservoir just above Townsend. Brocko silt loam and Brocko silt loam-wet soils (both minor, un-named components of the soil association) are the predominant soils in the management area. Brocko silt loam soil formed in windblown sediments (loess) on broad alluvial fans or stream terraces. This nearly level, deep, well-drained soil has medium runoff and a severe hazard of wind erosion. The wet phase of the soil is found on nearly level, low stream terraces. A seasonal high water table exists at a depth of 3 to 5 feet. Here again, the hazard of soil blowing is severe, and the seasonal high water table imposes a severe limitation for placement of septic tank absorption fields. The Brocko soils are used for irrigated alfalfa, sugar beets, corn silage, spring wheat, dryland small grains, and pasture.

Proceeding up the west shore of the reservoir, a second area of the Amesha-Brocko-Mussel association (No. 2 in figure V-7) occupies the management area from the west shore of the Missouri River, where it enters the south terminus of the reservoir, to approximately where the duck pond No. 4 embayment dike connects to the shore. Brocko silt loam - wet (described above), the Musselshell-Crago channery loams (previously discussed), and Thess silt loam (a minor, un-named component of the association) are the principal soils in the association. The Thess soil formed in strongly calcareous, gravelly, and cobbly alluvium of mixed origin on nearly level to gently sloping broad terraces and fans. The soil is deep and well drained, with a severe hazard of blowing. Runoff is medium. The soil is used mainly for winter wheat and range, although some areas are irrigated. Cottonwood Campground is located on bottom lands adjacent to the Missouri River.

Continuing north, the next 3 miles of the management area are occupied by the Radersburg-Hilger-Scravo association (No. 3 in figure V-7). The Radersburg very cobbly loam occupies almost the entire area within the study boundary in this vicinity. The Radersburg soil formed in gravelly and cobbly old alluvium on gently sloping fans and terraces. The soil is deep and well drained. Runoff is medium, and the hazard of erosion is slight. The soil is used mostly for range. Silos Campground is situated on this soil.

The next soil association encountered along the western reservoir shore is the Musselshell-Crago association (No. 8 in figure V-7). It extends to the Broadwater-Lewis and Clark County line and is crossed by a segment of the Sappington-Martinsdale association (No. 5 in figure V-7) at the Beaver Creek inlet. South of the Beaver Creek inlet, within the study area, the Musselshell-Crago association is composed principally of the Musselshell-Crago channery loam soils (previously described), on steep banks adjacent to the reservoir, and Musselshell

gravelly loam soil, on bench tops trending back from the reservoir shore. The Musselshell gravelly loam soil consists of deep, well-drained, gently sloping soil on smooth fans and stream terraces. The soil formed in strongly calcareous gravelly and cobbly alluvium. Runoff is medium, and the hazard of soil blowing is moderate. The portion of the association ranging from north of the Beaver Creek inlet to the Broadwater-Lewis and Clark County line is composed principally of the Cabbart complex soil. The Cabbart complex consists of shallow, moderately steep to steep, well-drained soils on ridges, sides of eroded terraces, and sides of drainageways. The soils of the complex formed in material weathered from platy, soft siltstone and sandstone of Cretaceous or Tertiary age. As might be expected, runoff is rapid, and the hazard from erosion is severe. Both the Musselshell gravelly loam soil and the Cabbart complex are used mainly for range.

The Sappington-Martinsdale association (No. 5 in figure V-7) occupies the land around the Beaver Creek inlet. Soils in this association are gently sloping, deep, and well drained. They lie on terraces, fans, and benches. According to sheet 9 of the soil survey report, it would appear that White Earth Campground is positioned on a neck of Brocko silt loam soil, a minor, un-named component of the association. As previously described, this soil lies on rolling fans formed from loess. Runoff is medium, and the hazard of soil blowing is severe.

North of the Broadwater-Lewis and Clark County line on the west shore, the Tropal-Rencot-Tolman association (No. 10 in figure V-7) extends to a point just above Mahogany Cove Campground. As at the north end of the reservoir (described initially), this association forms hilly to very steep, shallow, well-drained soils on ridgetops and side slopes in mountainous terrain. Mahogany Cove Campground lies on a toe slope coming off the Spokane Hills.

The Woodgulch-Elbeth-Baxendale association (No. 12 in figure V-7) picks up north of the Tropal-Rencot-Tolman association and extends to about where the Sheriff Gulch drainage enters the reservoir. Steep slopes are occupied by the Woodgulch-Elbeth-Rock outcrop soil unit, while lesser slopes are occupied by Brocko silt loam soil (previously described). Woodgulch and Elbeth soils are very deep, well to somewhat excessively drained soils formed in coarse-grained granite rock on foot and back slopes in mountainous areas. Runoff is medium on the Woodgulch soil and rapid on the Elbeth soil. The hazard of soil blowing is slight on both. The Chalet, Fish Hawk, Lorelei, Lewis and Clark, Orchard, and Crittendon Campgrounds, which are in this area, are located on toe slopes of the Spokane Hills on the Woodgulch-Elbeth-Rock outcrop soil unit; Overlook Campground is situated on a rolling upland expanse of Brocko silt loam.

In summary, the management area surrounding the reservoir encompasses a complex array of soils that reflect the variety of geologic materials and landforms common to the area. In general, soils on the east shore of the reservoir are more highly wind erosive than soils on the west shore. Their high lime content produces the dust evident during windy days that necessitates the use of dust abatement measures on area roads. Within the management area, dust is a problem on the access road to Hellgate Campground, on the east shore road in the

Magpie Creek drainage, and on the west shore road, where dust is held in the road corridor by timber. Dusty conditions are particularly prevalent during extended dry periods and when there is little or no wind present to move the dust off the roads. Additionally, to counter soil blowing from the exposure of about 9,000 acres of bottomland during low-flow periods, Reclamation was prompted to construct water embayment areas at the south end of the reservoir in 1973.

Steep slopes, shallow depth to bedrock, and susceptibility to erosion, common to the soils in the area, have presented problems in past development and will continue to do so. Soil conditions will need to be factored into future development plans and management programs.

Erosion.—The four primary agents of soil erosion at Canyon Ferry Reservoir are wave action along the shoreline, exposure of bare ground from off-road vehicle (ORV) use, wind, and runoff from storm events.

Erosion due to wave action is evident around most of the shoreline, except in areas where the shoreline is gently sloping (figure V-8). No studies have been conducted to determine the rate of shoreline erosion. In some instances, the loss of shoreline materials has prompted remedial action, such as safety fencing at Lorelei and retaining walls and riprapping below the cabin sites.

ORVs remove the vegetation cover essential for soil protection. Since most of the soils around Canyon Ferry are moderately to highly erosive, loss of vegetation cover quickly results in rill and gully erosion when storms occur. This type of erosion is prevalent around the camp-grounds on the north shore, where dirt bikes have been used for hill climbing, and at Hellgate, where recreationists have driven along the shoreline to the north.

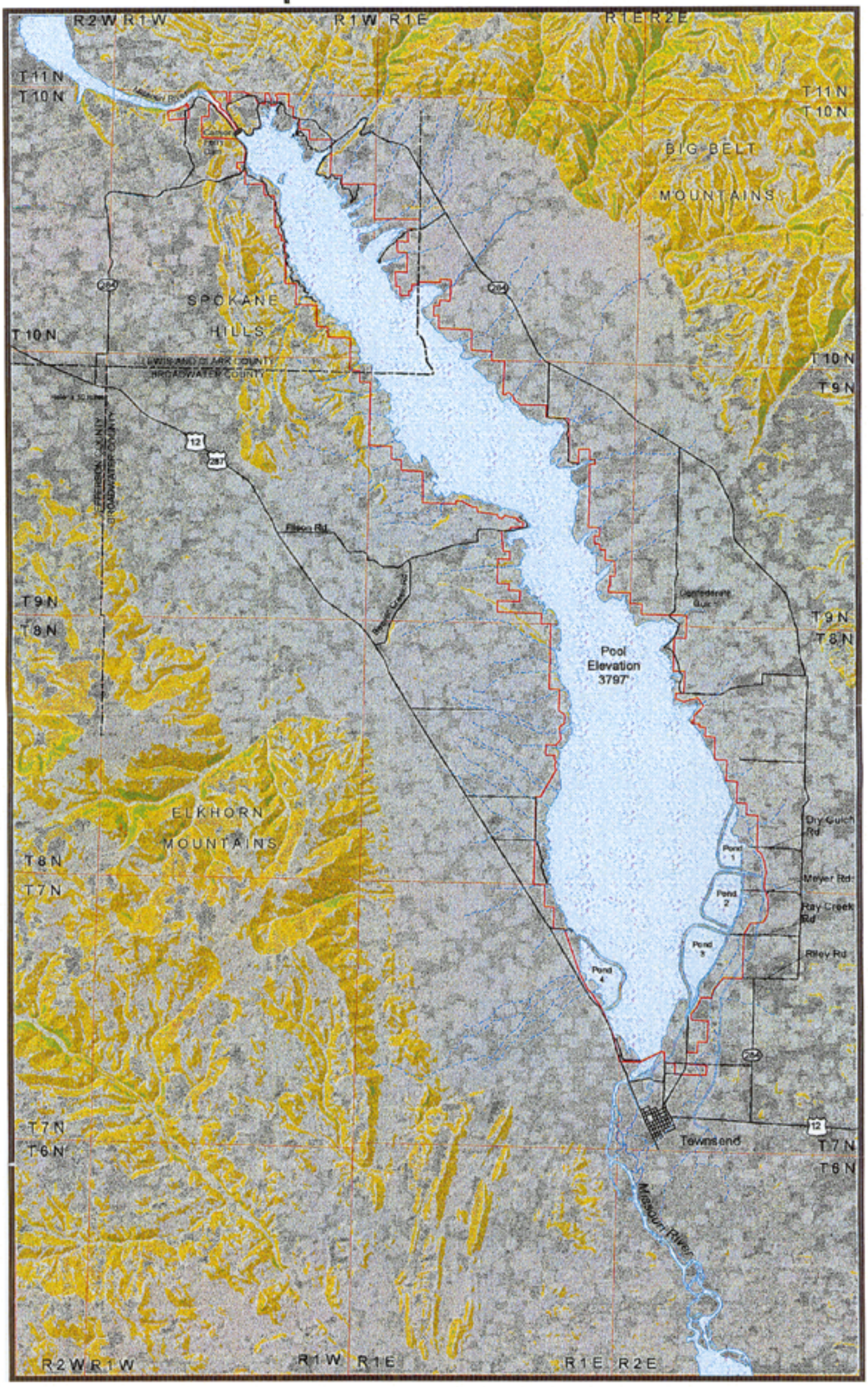
Wind and precipitation are continually acting to reshape the landscape. Factors such as (1) the frequency, duration, and intensity of wind and precipitation; (2) length and steepness of slope; (3) slope aspect; (4) inherent soil erodibility; and (5) ground cover condition determine the volume and rate of soil loss.

Prime Farmlands.—It is estimated that soils on about 1,200 acres of the study area are considered "prime if irrigated"[7] (figure V-9). Of these soils, about 1,000 acres are located in the Wildlife Management Area (WMA) at the south end of the reservoir, and there are scattered parcels of prime if irrigated soils on the southwest and east-central sides of the reservoir. Prime if irrigated soils in the management area include: Amesha loam, Brocko silt loam, Brocko silt loam - wet, Thess silt loam, and the Delpoint and Crittendon soils on 2 to 8 percent slopes.

[7] USDA, NRCS, Great Falls, Montana, February 14, 2000. Prime farmland lists for Lewis and Clark and Broadwater Counties are tentative and subject to change.

Canyon Ferry Reservoir

Slope Classifications



Legend

- Study Area Boundary (Bureau of Reclamation jurisdiction)

Hydrology

- Intermittent
- Perennial
- Canal

Slope Classification

- 0 - 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- above 20%

2 0 2 4 Miles

N W E S

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Figure V-8

Canyon Ferry Reservoir

Environmental Constraints

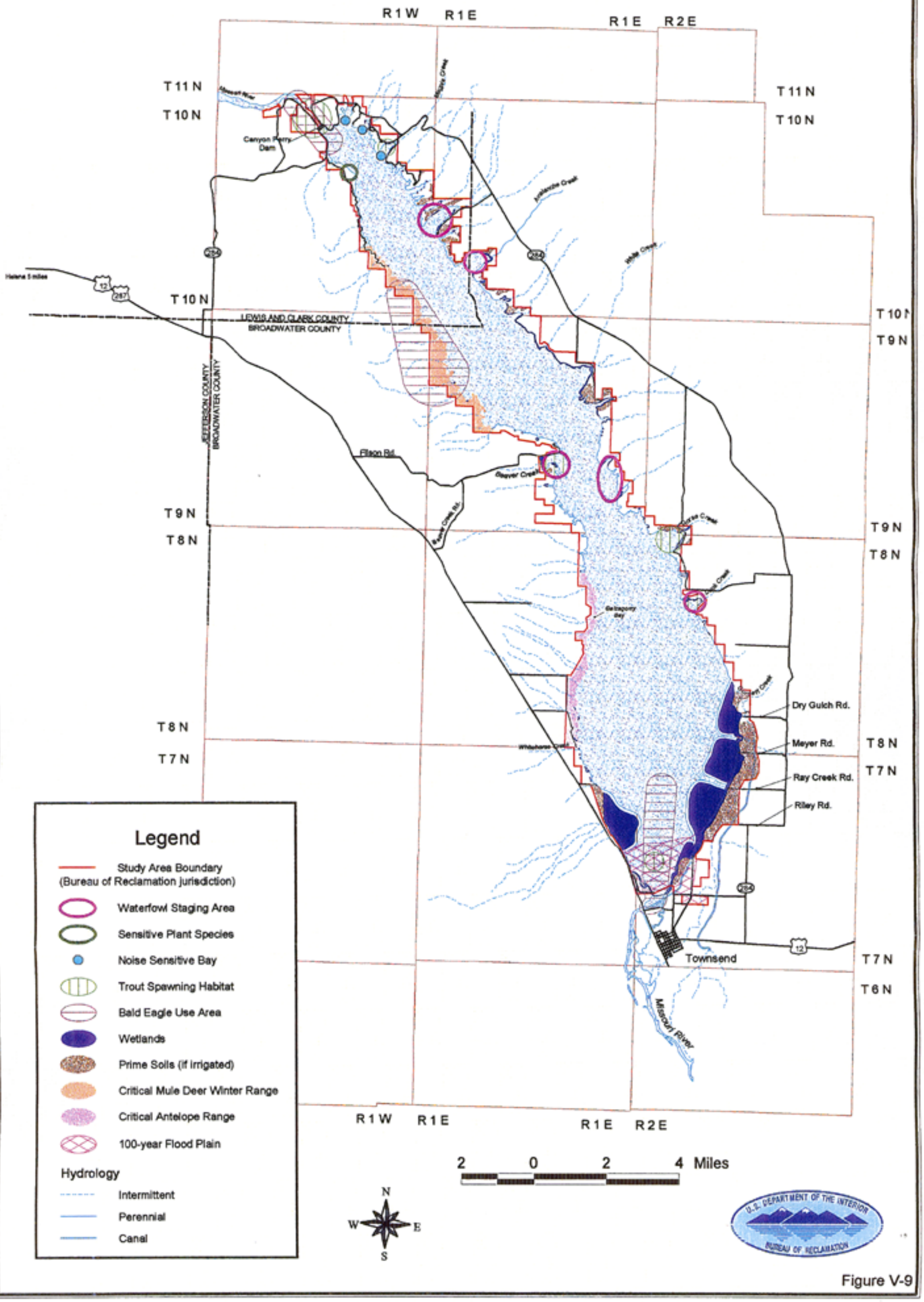


Figure V-9

Topography.—The northwest shore, from Yacht Basin to about 6 miles south, is steeply sloping, often forming along sheer, rocky cliffs. Most Reclamation lands, however, are moderately sloped (5-10 percent) toward the reservoir. Gentle slopes of less than 5 percent are located mid-reservoir on both the east and west shores (see figure V-8).

Environmental Consequences

Alternative A.—Since boundary and internal fencing would not be completed, livestock and ORV trespass would continue, resulting in erosion, sedimentation, and dust generation. Efforts to curb erosion from shoreline wave action would follow policies developed by a committee established through the Canyon Ferry Unit, Montana, Cabin Lease Lots Sale Final EA and FONSI, February 2002. Soil information would be used on a case-by-case basis for implementing site development, but not as a general planning tool. Some soil impacts from general recreational use and natural causes would be unavoidable. Overall, current soil erosion trends in the study area would continue.

Alternative B.—Under the "Policy Development and Land Use Strategy" and "Prime if Irrigated Soils" alternative elements, soil information would be integrated into all future land use decisions. Prime and sensitive soil areas would be protected, and soils with identified hazards would be avoided, where practicable.

Consistent with the "Erosion Control"and "Vehicular Access and Roads" alternative elements, exposure of soils to wind and water erosion would be reduced by strict limitation of ORV access and by better designation of human use areas. Degraded landscapes would be reclaimed, and appropriate erosion-control measures would be applied to protect public roads, Reclamation facilities, and developed recreation facilities where there is a public safety health concern.

Alternative C.—Measures to curb shore erosion by wave action would be implemented according to an established agency program. Impacts would be the same as under Alternative B.

Cumulative Impacts

As a consequence of anticipated recreational use of the study area, not implementing the RMP/EA would result in increased soil erosion and increased sedimentation from reservoir tributaries. Without a comprehensive land use planning strategy, opportunities might be lost to make the best use of available soil for designated uses (e.g., recreation areas, septic systems, wildlife areas, and trails). Implementing either of the action alternatives would reduce residual impacts and ensure that soil evaluation would be integrated into managerial decisions.

Mitigation

Careful design and proper maintenance of roads, trails, and public use areas would minimize erosion under either action alternative. Erosion-control measures would be used to avoid erosion during ground disturbance.

VEGETATION

Affected Environment

Vegetation information included in this plan was excerpted from a vegetation report prepared for the study area in the fall of 1991 by OEA Research, Helena, Montana. (*Canyon Ferry Reservoir Vegetation, Wetlands, and Weed Inventory* is available at MFWP or Reclamation's Montana Area Office [MTAO].)

Habitat Types.—Four distinct vegetation groups, based on life form and species composition, are present around the perimeter of Canyon Ferry Reservoir. The vegetation groups are grassland, upland shrub, coniferous forest, and riparian vegetation (figure V-10). Within these four groups are several distinct habitat or dominance types that correlate to those described by Pfister (1977), Mueggler and Stewart (1980), and Hansen et al. (1988). Additionally, vegetation types are described that are composed primarily of introduced species and do not correspond to a classification system.

Grassland.—The grassland component is composed of two habitat types, one vegetation type, and two pasture types. Most of the grassland area is composed of the needle-and-thread, blue grama habitat type. This habitat type dominates the central and southern portions of the study area. Meadows at the north end of the reservoir are primarily of the blue-bunch wheatgrass habitat type. Both habitat types correspond well to those described by Mueggler and Stewart (1980). The introduced grassland vegetation type is present around the reservoir in drainage bottoms at the interface between riparian corridors and upland vegetation types. The two pasture types are primarily at the south end of the study area, within or adjacent to the WMA.

Upland Shrub.—The study area encompasses two upland shrub types, both of which are restricted to the northern portion of the reservoir. They abut the needle-and-thread habitat type to the south and the coniferous forest types to the north. The upland shrub types are the big sage-brush/bluebunch wheatgrass habitat type and the mountain mahogany/ bluebunch wheatgrass habitat type.

Canyon Ferry Reservoir
Vegetation Groups

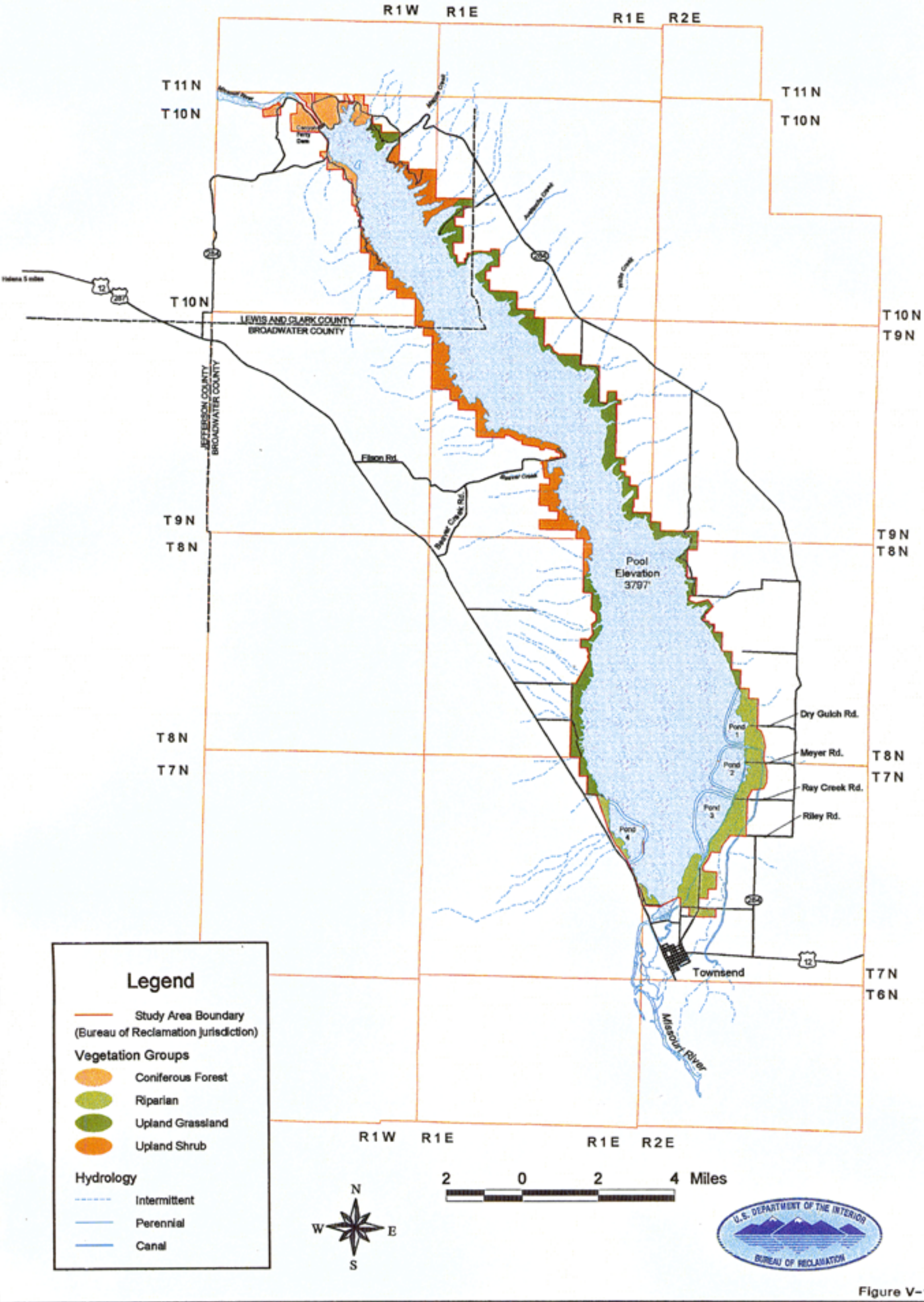


Figure V-10

Coniferous Forest.—Two coniferous forest habitat type are present at Canyon Ferry Reservoir: the Ponderosa Pine/bluebunch wheatgrass habitat type and the Douglas-fir/rough fescue habitat type. They occupy the north and northwest portions of the shoreline from Magpie Bay on the east to the Lewis and Clark-Broadwater County line on the west.

Riparian Vegetation.—There is an intermittent riparian zone around Canyon Ferry Reservoir. The largest riparian area is at the south end, where the Missouri River forms a delta as it flows into Canyon Ferry Reservoir. Other zones of riparian vegetation include the larger drainages of Confederate Gulch and Beaver, Duck, and Magpie Creeks. Shoreline riparian vegetation is evident in the vicinity of Goose Bay. The artificial ponds and associated islands on the east and west sides of the southern portion of the reservoir also support riparian vegetation.

There are two dominance types that occupy most of the riparian zones around the reservoir: narrow-leaved cottonwood and sandbar willow. Three types that occupy small areas are quaking aspen, cattail, and bulrush. All the riparian areas around the reservoir are highly disturbed, as seen by the abundance of introduced pasture grasses and noxious weeds.

Rare and Endangered Species.—No rare or endangered plant species were observed during the vegetation reconnaissance. One sensitive plant, rabbit crazyweed (*Oxytropis lagopus* var. *conjugens)*, is known in the study area. The Montana Natural Heritage Program ranks it as globally secure but imperiled in Montana (G4T2, S2). It is found on the west shore of the reservoir, in the Ponderosa Pine habitat type. The plant was not observed during the reconnaissance survey.

Wetlands.—Aside from the reservoir itself, most of the individual wetland sites found in the study area are associated with the fringe of Canyon Ferry Reservoir and, thus, have become established only since dam construction and reservoir filling in the early 1950s (see figure V-9). More recently established wetlands are associated with the diked ponds completed in 1978. Annual fluctuations promote the presence of drawdown wetlands typified by nonpersistent, often weedy, hydrophytic (water-loving) vegetation. Long-term drawdowns encourage the development of more stable communities, typified by pioneer species such as sandbar willow.

Wetlands are also associated with the Missouri River, at the south end of the reservoir, and perennial tributaries such as Duck Creek. These wetlands have existed for a long time, although natural successional processes, the introduction of non-native plants, and human activities, such as farming, have caused vegetation changes.

Wetland dominance types have been grouped according to location around the reservoir. Each of the dominance types listed below may be found within an appropriate grouping.

The "Wetlands Classification" section of the Canyon Ferry Reservoir Vegetation, Wetlands, and Weed Inventory is available at MFWP and Reclamation's MTAO.

Narrow-Leaved Cottonwood Dominance Type.—This community was described above in the "Vegetation" section; however, only a portion of this riparian community meets jurisdictional wetlands criteria. Typically, where upland plants (such as Kentucky bluegrass, snowberry, and juniper) dominate the understory, the soils are not hydric (water associated). When species such as dogwood or sandbar willow are present, the areas meet the wetlands criteria.

Sandbar Willow Dominance Type.—The sandbar willow dominance type is present along the shoreline, in bays, and in the complex of ponds and islands. It is also the most extensive wetland type identified. It commonly occupies an area of minimal soil development between the high water mark and the beginning of the narrow-leaved cottonwood dominance type.

Drier shoreline and pond areas dominated by this type include primarily introduced grasses and weedy forbs such as smooth brome, Kentucky bluegrass, redtop, Canada thistle, musk thistle, spotted and Russian knapweed, whitetop, and broadleaf pepperweed.

Common Cattail Dominance Type.—During a field survey, the common cattail dominance type was observed at locations around the reservoir from Riverside, along the Missouri River at the north end of the study area, to the ponds and delta area at the south end. This dominance type is limited to small patches along the Missouri River at all but the southern end of the reservoir. Within the ponds, it is occasionally present along the inner shore of the dike. It is more prevalent along the shore of the ponds, although still occurs intermittently. Adjacent drier communities range from reed canarygrass to seeded stands of tall wheatgrass and weedy forbs.

Softstem Bulrush Dominance Type.—Stands of softstem and hardstem bulrush were observed during a field survey along the shoreline of ponds 2 and 3 (see figure V-9). Most stands were very small, in water right at the shoreline, and basically a monoculture. One stand was located adjacent to a cattail stand. Also, bulrush was planted in a few places within the diked wildlife/waterfowl ponds. Adjacent dryland species include reed canarygrass, tall wheatgrass, Canada thistle, and a variety of weedy forbs.

Reed Canarygrass Dominance Type.—Stands of reed canarygrass are found throughout the study area along streambanks and near the shoreline of the reservoir, where the water table is

at or near the ground surface. This type is extensive. The heavy sod formed by this species usually excludes other plants. The sandbar willow dominance type usually borders this type.

Common Spikerush Dominance Type.—Common spikerush dominance type is found along the fringes of side channels and the delta of the Missouri River, where water is slow moving and seasonal fluctuations are small. Associated species include common mint, silverweed cinquefoil, and sedges. Reed canarygrass often neighbors this type.

Needle Spikerush Dominance Type.—Needle spikerush dominance type is found in exposed pond bottoms and is typical of widely fluctuating water tables. It forms dense sods. Associated species include water grounsel and dock. Adjacent communities include those dominated by aggressive pioneers of the exposed mudflats described below.

Seasonal Mudflat Dominance Type.—This type includes a number of early, successional species that are aggressive invaders of very shallow water and exposed mudflats of the ponds and a few backwater bays of the reservoir that are exposed yearly as the lake levels drop. Typically, these plants form narrow bands as sites dry out over the summer. Included in this type are Ladysthumb knotweed, golden dock, and common cocklebur. Adjacent wetter communities include needle spikerush. Drier sites are dominated by sandbar willow.

Sedge Dominance Type.—Pure sedge types are very limited in the study area. Sedges are usually found as components of other types. However, knot-sheath sedge occurs in nearly pure stands in wet meadows at Bedford and in a few spots adjacent to common spikerush communities.

Common Reed Dominance Type.—This dominance type was noted in only one spot at the south end of the reservoir and covered less than one-tenth of an acre. Reed canarygrass and sedge communities surround the stand.

Watercress/American Speedwell Dominance Type.—The watercress/American speedwell dominance type was found in a small perennial stream at Bedford. These floating aquatic plants, which form dense mats, depend on cold, flowing, shallow water. Cattail and knot-sheath sedge communities border the stream.

Open Water Dominance Type.—The open water dominance types occur near the Missouri River and other tributaries to the reservoir, the shallow and deep water habitat of the reservoir

itself, the waterfowl ponds at the south end of the reservoir, and in a number of perennial ponds. The latter are often occupied by dense algal communities and, to a lesser extent, occupied by water milfoil.

Weeds.—A Canyon Ferry Lake Vegetation, Wetlands, and Weed Inventory was prepared by OEA Research (October 29, 1991) for inclusion in the Canyon Ferry RMP/EA that was scheduled for completion in the spring of 1993. Every recreation area around the lake, except those accessible only by boat, were visited during the inventory process. Additionally, several west side bays accessible only by boat were visited. Historic agricultural, recreational, and grazing uses of the study area are evident in the presence and abundance of introduced species, particularly pasture grasses and weedy forbs. Noxious weeds (Montana Department of Agriculture designated category I weeds) are present in virtually all vegetation communities around the lake and are most abundant in the mesic and riparian communities.

Since the initial weed inventory completed in 1991, additional mapping was done in 1996, 1997, 1998, and 1999. Weed infestations have been mapped on nearly all of the Reclamation lands around the lake. The weed species found during mapping include Spotted knapweed, Russian knapweed, Diffuse knapweed, Dalmation toadflax, Leafy spurge, Whitetop, Canada thistle, Musk thistle, Bull thistle, Field bindweed, Hound's tongue, Common mullein, and Perennial pepperweed. Most of these weeds take over native grasses and forbs and reduce the forage available to wildlife. Hound's tongue is toxic to animals, especially horses, if eaten at certain times of the year and in sufficient quantities. Studies have shown that some of these weeds, especially Spotted knapweed, cause increased soil movement as the native species are displaced.

Spotted knapweed can be found around the lake, with the heaviest infestations found on the north and south ends. Russian knapweed, Whitetop, and Perennial pepperweed are found more commonly on the deeper soils along the east and south shore of the lake, often in mixed stands in the Avalanche Bay area and south towards White Bay. Leafy spurge is well established in many drainages and moist areas around the lake and is expanding outward from these sites. Dalmation toadflax is well established along the west shore, in the Spokane Hills area, and in the Eagle Bay Drive and Riverside Campground areas. Dalmation toadflax has a very high rate of spread and can invade a wide range of soil types. Hound's tongue is currently not present in large infestations, but more plants are becoming evident each year. Field bindweed is present at Goose Bay and along the lower reaches of Eagle Bay Drive. Canada thistle is well established in the more mesic, disturbed areas, and Musk thistle occupies a similar niche as Canada thistle but is not as prevalent. The largest infestation of Musk thistle was near Hellgate Campground and has been well controlled since 1998.

Canyon Ferry Reservoir is one of the most heavily used reservoirs in Montana and draws people from throughout the Nation. Many of the visitor's vehicles and equipment have weed seeds stuck on them; therefore, new weed infestations commonly occur in the campgrounds and roads. Not only do visitors bring in weed seeds from other parts of the country, but they also take weed seeds from Canyon Ferry Reservoir to other places they visit. ORVs also

introduce and distribute weed seeds along trails and along cross-country travel routes. Other vectors for weed seed dispersal include birds, wildlife, livestock, wind, and water. The combination of all these dispersal mechanisms contributes to the rapid spread of weed infestations found at Canyon Ferry.

Many infestations are starting along roads and areas with motorized use. In cooperation with Broadwater and Lewis and Clark Counties, a considerable effort has been made to curb further spread of weeds from these travel corridors. Weed seeds are also being transported by water to the shoreline. The use of chemicals has been avoided in the riparian fringe that exists around the reservoir shorelines because of the risk of eliminating the desirable vegetation that is important to wildlife and shoreline stability. In addition, the use of chemicals near open water has the potential to contaminate surface and groundwater resources. An effort is underway to establish viable populations of insects to control weeds in these riparian areas; however, this will take considerable time to achieve and will probably not totally eliminate the target weed species. A continued effort will be needed to ensure that the weeds are not allowed to re-invade the lands beyond the riparian fringe.

As the weed infestations at Canyon Ferry rapidly grew, recreationists, landowners, and agency managers became concerned. Many adjacent landowners were concerned that large weed infestations were spreading from Reclamation lands to private lands used for agriculture. In August 1993, Reclamation completed a comprehensive weed management plan for Canyon Ferry Reservoir and, in a 5-year interagency agreement, the Bureau of Land Management (BLM) agreed to take the lead in weed control. During that time, approximately $158,200 was spent on the Canyon Ferry Weed Program. This is part of a larger weed control effort that also involved the surrounding private, National Forest, and BLM lands, and this does not include the work
done by MFWP in the WMA. Work accomplished included weed mapping, spraying, use of biological control agents, education efforts, administration, and monitoring. 1,930 acres of land were treated with chemicals and 111,541 insects released during 44 releases. Weeds have been mapped on nearly all Reclamation lands around Canyon Ferry Reservoir. Some areas have been searched three times to identify plants that were missed the year before or that germinated that spring. In addition, all of the developed recreation sites are mowed two or three times a year, which reduces the weed's seed production. Many large infestations at Canyon Ferry have been reduced to scattered individual plants, or clumps of plants, and a continued effort is needed to "wear out" the seed source stored in the soil.

Additional Weedy Species.—Several weedy species, in addition to those previously mentioned, occur around the lake. Bindweed is present, primarily in the vicinity of Goose Bay. It occupies several acres on the north shore of the bay. Hound's tongue is present intermittently throughout much of the study area, primarily in drainage bottoms. Populations are locally small (less than 100 plants). Musk thistle is present in habitat similar to Canada thistle, but is not as widespread.

Sartorius (1988) reported that yellow sweetclover was sprayed as part of Reclamation's weed control program. It is, however, planted by MFWP for cover in the WMA.

Although broadleaf pepperweed is not classified as a category I noxious weed, it is widespread around the lake. Broadleaf pepperweed occupies habitat similar to whitetop and Russian knapweed and was observed in the mixed infestation in Avalanche Bay and along the east shore north of Goose Bay. It is also found on the west side of the lake in bays accessible only by boat.

Weed Control.—The State's noxious weed law requires private property owners to control weeds on private land or face penalties and potential control by the county weed district.

Weed control on the WMA is conducted differently. This effort is funded with MFWP and Reclamation funds; Reclamation pays for chemicals, and MFWP pays labor costs.

About $4,000 to $5,000 is spent annually on weed control in the WMA, with Reclamation spending $2,000 to $3,000.

Reclamation has set policy on pesticide and herbicide application. If a cabin site owner or concessionaire wishes to apply chemicals to Reclamation lands, a plan must first be submitted to, and approved by, Reclamation.

BLM assisted Reclamation and coordinated the weed control program at Canyon Ferry Reservoir pursuant to an Interagency Agreement, as amended, through January 2002. This was done through an integrated pest management (IPM) program. BLM, as an active cooperator, worked with managers of neighboring land and waters to protect the land-based resource. Reclamation and BLM worked to implement a cohesive and broad range of coordinated programs involving research, monitoring, education, and control to develop an effective weed management program.

Reclamation will continue to implement the weed management plan to control noxious weeds through prevention, eradication, suppression or reduction, containment, and tolerance. The plan has the goal of developing an integrated noxious weed management plan to utilize the latest technology to significantly manage and reduce the noxious weed populations with minimum environmental impacts to the area.

The scope of the plan includes all State noxious weeds on Reclamation lands immediately adjacent to Canyon Ferry Reservoir. The plan describes three categories of weeds in Montana:

- **R** Category 1: Weeds that are currently established and generally widespread in many counties of the State.

- **R** Category 2: Weeds that have been recently introduced into the State or are rapidly spreading from their current infestation sites.

- **R** Category 3: Weeds that have not been detected in the State or may be found only in small, scattered, localized infestations.

Reclamation will use the appropriate methods to manage the weed infestations on the lands around Canyon Ferry. More information can be found in the plan.

The IPM uses a combination of chemical, biological, mechanical, cultural, and integrated methods to control invasive species. The first three methods are probably the most widely used, with cultural control practices (i.e., environmental restoration or ecosystem management) being recently recognized as a viable means for control.

Chemical control is one of the most widely known and effective short-term management options. There are hundreds of different chemicals and adjuvants, each useful for a specific target plant and/or situation. Because of growing environmental concerns by the general public, there has been a trend toward decreased use of chemical applications for the control of noxious plant species whenever possible. The Montana DEQ requires that pesticide and herbicide applicators be certified by attending classes and taking tests to prove they know how to apply those chemicals.

Biological control is the introduction by man of any parasite, predator, or pathogenic micro-organism into the environment for the suppression of some target plant of animal pest. The use of biocontrol typically does not mean the complete eradication or elimination of some target from a specific area. Instead, biocontrol operates by reducing a target population to lower, more realistic, levels. Biocontrol is typically a long-term, environmentally acceptable approach for the control of a target plant species; however, observable impacts may take up to 10 years.

Mechanical methods, such as hand harvesting, mower, and harvester, represent a environmentally compatible option and can be used readily by nontechnical personnel. Mechanical methods are often the most expensive and can become cost prohibitive very quickly. The use of large mechanical machinery often fragments the plants, causing them to disperse across larger regions more readily.

A variety of environmentally acceptable weed control practices and techniques are aimed at preventing or reducing the entry or spread of noxious plant species. Inspections may be made at State borders to ensure that no undesirable species are imported. Another type of control is using native plant species to prevent the spread or introduction of noxious vegetation in a particular area; however, there can never be 100-percent prevention of the entry of noxious plants into the country or a specific locality. Also, the use of native plants to prevent the spread or introduction of noxious plants is often cost prohibitive and, in many cases, techniques for planting and cultivating the natives are unknown.

Integrated control is the use of all available management practices in as compatible a manner as possible. Integration is the single most important overall management technique available for controlling noxious plant species. By applying all available techniques to a specific noxious plant problem, more cost-efficient, environmentally compatible long-term management is typically achieved.

Environmental Consequences

It is assumed for the environmental analysis portion of this report that recreational use at Canyon Ferry will occur regardless of which alternative is chosen. Impacts to the affected (existing) environment are discussed from a programmatic standpoint because exact construction activities are not known at this time. All that is known is that a particular activity might occur.

Alternative A.—Except for the Broadwater Bay recreational facilities proposed for Silos, no other construction activities are anticipated under this alternative. Most of the Silos area, where Broadwater Bay recreational facilities would be constructed, is grassland. The grassland is currently adversely impacted by recreationists and ORV use. ORV and all-terrain vehicle (ATV) use around the reservoir would continue to expand under this alternative. Most of the effects would be on upland shrub and grassland, although riparian areas along the margins of bays could be adversely impacted. Reclamation will continue to implement the weed management plan to control noxious weeds through prevention, eradication, suppression, or reduction. Continuing with the 1993 comprehensive weed management plan, the weed control agreement with Broadwater County, and finalizing a long-term weed control agreement with Lewis and Clark County should help to reduce the presence of noxious weeds within the study area.

Alternative B.—In addition to the development proposed in Alternative A, this alternative would include trail construction, new restrooms, new day-use areas, rehabilitation of existing campgrounds and day-use areas, moderate expansion of facilities at White Earth and Confederate Bay, and a boat ramp. Trail construction proposed in this alternative would directly affect upland shrub vegetation. This would be a slight increase over the affects of Alternative A. The net effect on vegetation would be positive because this alternative would include the development and implementation of a comprehensive land use planning strategy. Additionally, road closure and development of access roads, which are a part of this alternative, would limit future impacts to vegetation because ORV use would be curtailed. Reclamation will continue to implement the weed management plan to control noxious weeds through prevention, eradication, suppression, or reduction. Continuing with the 1993 comprehensive weed management plan, the weed control agreement with Broadwater County, and finalizing a long-term weed control agreement with Lewis and Clark County should help to reduce the presence of noxious weeds within the study area. The weeds should be better controlled through the land use planning strategy by limiting vehicular access to certain areas or trails and improving the monitoring of the lands.

Alternative C.—Similar to Alternative B, additional campground, day-use, and trail construction under this alternative would directly affect upland shrub vegetation. This would be an increase over Alternative B. It is still expected that the net affect on vegetation would be positive because of the development and implementation of a comprehensive land use planning

strategy coupled with road closures. Reclamation will continue to implement the weed management plan to control noxious weeds through prevention, eradication, suppression, or reduction. Continuing with the 1993 comprehensive weed management plan, the weed control agreement with Broadwater County, and finalizing a long-term weed control agreement with Lewis and Clark County should help to reduce the presence of noxious weeds within the study area. The weeds should be better controlled through the land use planning strategy by limiting vehicular access to certain areas or trails and improving the monitoring of the lands.

Cumulative Impacts

Vegetation resources would continue to decline as use increases. Grassland and upland shrub vegetation would be affected most, but none of the alternatives would radically alter any of the existing vegetation types.

FISH AND WILDLIFE

Affected Environment

The State of Montana maintains management responsibility for fish and wildlife resources in the State. Information was taken from the *Upper Missouri River Reservoir, Fisheries Management Plan 2000-2009* (MFWP, Fisheries Division, January 2000), which established fisheries management at the reservoir.

Fish.—

Existing Fisheries.—The sport fishery of the Canyon Ferry Reservoir, as well as the Missouri River system, consists primarily of rainbow trout, brown trout, yellow perch, mountain white-
fish, burbot, and walleye. Nongame species in this system are abundant but not particularly diverse. The four primary nongame species include carp, longnose sucker, white sucker, and Utah chub.

Anglers at Canyon Ferry Reservoir have historically fished for rainbow trout and yellow perch during ice-free months of the year. Yellow perch are particularly popular during the winter ice-fishing season. Burbot are also a popular sport fish during the winter and early spring season. The burbot population appears to be increasing in Canyon Ferry Reservoir, and there was a corresponding increase in angler interest in the species during the 1990s. Yellow perch and burbot sustain populations entirely through natural reproduction. Rainbow trout in Canyon Ferry Reservoir are primarily sustained through hatchery plants. Natural reproduction accounts for less than 10 percent of the total population of rainbow trout.

Brown trout populations are typically sustained by natural reproduction, but supplemental imprint stocking of brown trout occurred between 1992 and 1997. Brown trout have provided

an important trophy component to the fishery in the past, but low numbers of brown trout have resulted in low catch rates in Canyon Ferry Reservoir and the Missouri River upstream to Toston Dam since the mid-1990s.

Walleye have become a significant component of the Canyon Ferry fishery in the past few years. This newly established population has rapidly expanded to reach catchable numbers. Before 1996, no walleye were observed in the standard roving creel census, and reports of walleye caught by anglers were uncommon. During 1998, the walleye population was numerous enough that nearly 50 percent of the summer anglers were seeking walleye exclusively or in combination with other species such as perch and trout.

Angling pressure at Canyon Ferry typically ranks near the top of the Statewide angling pressure survey, averaging about 86,000 angler days per year from 1982 through 1997. However, angling pressure has increased to approximately 94,000 angler days from 1993 to 1997, the last reported visitation figures.

Fisheries Management.—The Montana Consensus Council conducted public involvement throughout 1998, leading to acceptance of the goal to manage the upper Missouri reservoir system, consisting of Canyon Ferry, Holter, and Hauser Reservoirs, within the State as a multispecies fishery.

The goal for managing the Canyon Ferry-Missouri River fishery outlined in the plan is to maintain a cost-effective, multispecies fishery that sustains the current level of angler use during both the open-water and ice-fishing seasons. Management of the multispecies fishery will attempt to maintain historically desirable species (rainbow trout, yellow perch, brown trout, and burbot), while adopting management strategies to integrate the expanding walleye population.

Specific management goals and objectives, rationale, and strategies, by species, is contained in the *Upper Missouri River Reservoir Fisheries Management Plan.*

Wildlife.—The reservoir provides a variety of wildlife habitats, but can generally be divided into two groupings: (1) the reservoir shoreline and surrounding uplands and tributaries coming into the reservoir and (2) the south end of the lake supporting the Canyon Ferry WMA. The WMA is managed by MFWP. These two areas are distinct in the types of habitat they provide and
the species present.

The goal for the WMA, as stated in the Wildlife Management Plan, is to provide productive habitat for the diversity of wildlife species that use the area and provide for consumptive and nonconsumptive use of those resources. Since dike construction, management emphasis has been on improving habitat associated with the dike/island complex to maximize waterfowl

production and to provide for hunter recreation. The area has become a popular spot for waterfowl and upland bird hunters. As vegetation communities develop over time, more nongame species are beginning to use the project.

Management by MFWP outside the WMA has consisted mainly of constructing boundary fences (primarily on the east side of the reservoir) to control ORV travel, trespass livestock grazing, and other uses inconsistent with management for wildlife. Because of the diverse opportunities, management has focused on developing and enhancing wildlife habitats of the WMA.

Antelope.—Antelope use both sides of the reservoir (figure V-11). The area on the east side of the reservoir is a portion of Antelope Hunting District 390, while the west side of the reservoir is included in Hunting District 380. Populations in both districts were relatively low through the 1960s and began to show increases in the mid- to late 1970s. Habitat on the west side of the reservoir tends to be less fragmented than on the east side and is considered more available to antelope. Habitat for antelope in both districts exists mainly on private land. A large portion of the east side has been put into agricultural production, fragmenting much of the
habitat left in this area. Conflicts between antelope and these operations have occurred periodically in the past. Land use on the west side is primarily livestock grazing, and concern by landowners over the increase in antelope numbers surfaced in the mid-1980s. Areas of public land important to antelope on the west side of the reservoir include the whole shoreline from the WMA to Beaver Creek. Areas of antelope concentration on the east side of the reservoir include Goose Bay, Avalanche Creek, and the Hellgate Gulch area.

Hunting permits for antelope in both areas have been adjusted periodically to address the concerns of landowners and reduce the number of antelope to a level more consistent with their shrinking habitat base.

Some of the antelope in each hunting district are associated with the reservoir. To more realistically address the animals associated with the reservoir, antelope on the west side (Hunting District 380) were divided into two groups: those east or west of Highway 287. The highway acts as a dividing line for the two main herds in this district. Based on total counts made since 1972, approximately 60 percent of antelope in this hunting district are associated with the reservoir. This currently amounts to around 250 antelope. The same holds true for antelope on the east side (Hunting District 390) of the reservoir. Antelope were considered to be associated with the reservoir if they were north of Highway 12, just east of Townsend. Since 1984, surveys indicate that approximately 78 percent of antelope in this area were associated with, or in close proximity to, the reservoir. This amounts to approximately 100 antelope.

The antelope harvest for the period 1980-90 has averaged 136 in Hunting District 380 and 25 animals in Hunting District 390, respectively. The population objective in both districts is to stabilize numbers at current levels. Harvest levels are set such that the total antelope

population is maintained at about 350 animals. This appears to be consistent with the decrease in the amount of habitat that has occurred over time and the increasing variety of land uses in this area. Further development on public and private land will make it difficult to maintain the current population at 350 animals.

Deer.—Mule deer and white-tailed deer inhabit almost the entire area around the reservoir (see figure V-11). The population of each species varies, depending on habitat quality and quantity. Very little actual deer survey work has been accomplished in this immediate area. Much of the area surrounding the reservoir is a prairie environment with either a sagebrush/grassland or a grassland/forb community with associated shrubby draws. In these areas, there are typically fewer than five deer of either species per square mile. Some habitats more typical of the intermountain region around the reservoir support higher densities of both species. The WMA supports a high-density, white-tailed deer population.

Elk.—Elk infrequently use the lands around the reservoir and frequently use the Hellgate area during hard winters (see figure V-11). A growing herd of elk use the Spokane Hills area and are commonly seen along the west shore between White Earth Campground and the Crittendon day-use site. This area has limited vehicle access and provides the elk with a secure area year round.

Moose.—Three to four moose are found in the WMA at the south end of the reservoir and, occasionally, in the Confederate Bay Area (see figure V-11).

Waterfowl.—The number of geese observed during the nesting period in the WMA has increased significantly since 1961. This is the result of nesting habitat created by the pond/island complex. The number of nests has increased almost annually. A total of 523 nests were located by MFWP in 1991. The number of nests in the delta adjacent to the WMA has stabilized between 20 and 30. An annual summer goose banding program initiated in 1974 has shown that geese hatched on the WMA have traveled as far south as California and as far north as Canada.

Monitoring duck nesting has shown that ducks have responded more slowly to the WMA primarily because they have specific nest cover requirements that are lacking on many islands and because of predation. A variety of species are located in the WMA, with mallards, redheads, and gadwalls the most numerous. Both ducks and geese gather in the WMA before spring and fall migrations.

Areas at the reservoir that are outside the WMA serve mainly as staging areas to attract waterfowl during spring and fall. There is a limited amount of Canada goose nesting around

Canyon Ferry Reservoir

Wildlife

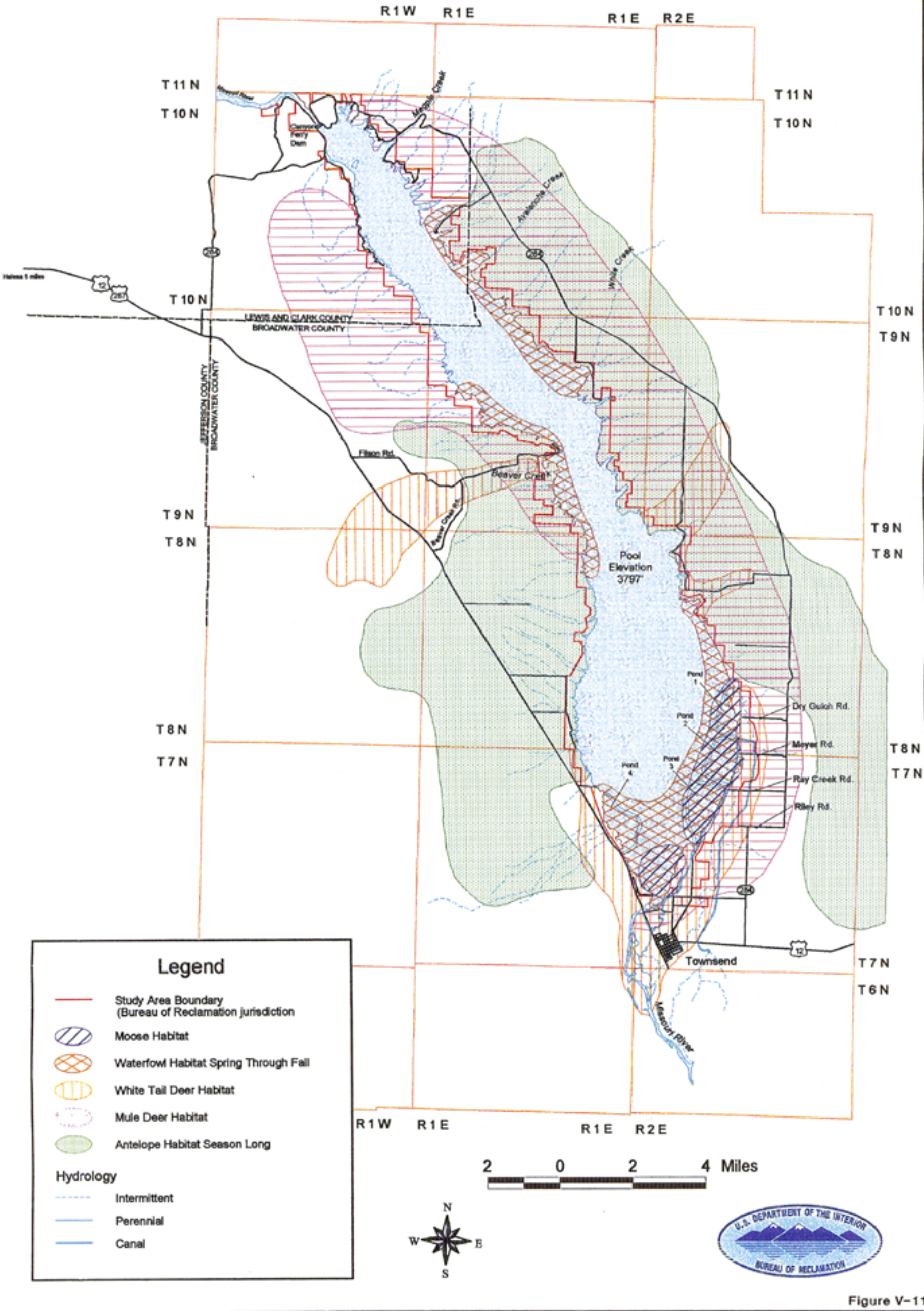


Figure V-11

the north end of the reservoir, where rock islands protrude above the water line. Backwaters and isolated bays provide secure loafing areas to waterfowl during spring and fall migration. These areas are attractive mainly because grain fields adjacent to the reservoir provide a food source. Such areas include the mouths of Duck, Avalanche, and Beaver Creeks. Concentrations of geese during the fall can occasionally be found in other isolated bays and shorelines around the reservoir. As is true of most species of Canada geese throughout North America, the number of geese associated with Canyon Ferry Reservoir have increased over time.

While there is limited nesting by Canada geese on the reservoir proper, certain areas provide attractive brood rearing habitat. The inlet to Beaver Creek, on the west side of the reservoir, is used consistently by geese for brood rearing, and over 100 geese have been observed during some years. Duck Creek Bay is also used for brood rearing by geese. Some geese in each area are probably birds that have nested on the WMA and moved off the project to raise their broods. As with staging areas, seclusion and minimal human disturbance make brood areas attractive. Also, succulent grass for forage is available, especially at Beaver Creek. A population of Canada geese rest and rear their young at Magpie Bay.

In January, MFWP annually conducts its aerial midwinter waterfowl survey, which includes the reservoir area. However, all but the north end is typically frozen over by this time. Generally, a few Goldeneyes are observed on the north end of the reservoir, while just below the dam, several hundred Goldeneyes, mallards, and up to 300 Canada geese are observed.

A heron/cormorant rookery, located on an island in the river within the WMA, was deserted in 1987 for no apparent reason. Cormorants shifted nesting activities to the pond system, while the fate of the herons is unknown. There are six osprey nesting structures on the WMA, and, generally, two or three are used annually. Terns, pelicans, and avocets also use the area for nesting.

A rich variety of avian fauna also uses the reservoir. In addition, common loons and western grebes occupy the reservoir during summer months. Pelicans and cormorants can be seen catching fish along the reservoir shoreline throughout the spring and summer. A variety of shorebirds is common during spring and fall migrations. To date, no specific management has been undertaken for these nongame species.

Upland Game Birds.—Pheasants are declining on the WMA apparently due to loss of habitat, changes in farming practices, and increased predation.

Pheasants, while not numerous, are found around the reservoir where there is suitable habitat. No surveys have been conducted to quantify pheasants in this area, but birds have been observed in the better riparian zones such as Duck Creek, Confederate Gulch, and Beaver

Creek. A local Pheasants Forever chapter, with permission from Reclamation, began developing pheasant habitat along the east shore of the reservoir in 1999. If successful, the chapter plans to increase the habitat.

Hungarian partridge and sharptail grouse occur sporadically around the reservoir. Habitat more attractive to partridge (Weigand, 1980) is found away from the reservoir in association with grain fields on the east side of the reservoir.

Merriam's wild turkeys were transplanted into the Spokane Hills by the Montana Fish and Game Department in 1964 (10 toms and 16 hens). These birds, or their descendants, evidently moved north, and a small population now exists near the town of York. A graduate student tracked the movement of wild turkeys in the Canyon Ferry Reservoir area by monitoring radio-banned birds and documented the results in a study report (Holzer, 1989). Some turkeys came as far south as Cave Gulch, on the north end of the reservoir. Habitat along the reservoir in this area would be considered suitable turkey habitat (Ponderosa Pine/grassland); however, most of this area is now leased cabin sites and private housing developments, both of which decrease available habitat.

Raptors.—In 1990, a project funded by several agencies sought to survey and inventory raptors along the Upper Missouri River (Harmata, 1990). The survey area ran along the Missouri River watershed from Three Forks to Wolf Creek, which includes Canyon Ferry Reservoir. The main emphasis of the survey dealt with peregrine falcons and bald eagles, but one of the objectives of the study was to survey and record all possible diurnal raptor and great-horned owl breeding areas, with emphasis on woodland raptors. The results of this survey indicate that a variety of raptors are associated with the reservoir complex (table V-2). "Occupied territories" were areas where adult raptors were located between May 15 and August 30, and the behavior of the birds indicated a long-term presence in the area. An "Occupied territories with a nest" was based on the presence of adults associated with a nest or recently fledged young. Raptors, regardless of age, not associated with a territory or nest, were recorded as incidental observations.

A census of osprey associated with Canyon Ferry Reservoir was conducted by Grover (1983). A total of 52 osprey nests were located during the two survey years (1981-82). Grover also found that the reservoir supported a higher density of nesting osprey (0.54 occupied nests per kilometer) than the free-flowing river portion of the study area (0.03 occupied nests per kilometer). A yet-to-be published survey of osprey use of the reservoir has been completed by Harmata (Harmata, unpublished data, personal communication, 2000) The survey identified 32 active osprey nests.

Bald eagle use in the 14-mile reach below Canyon Ferry Dam peaked at 302 eagles during the first week in December 1991. Since 1991, bald eagle use of this reach has steadily declined, with

Table V-2.—Species and number of raptors associated with Canyon Ferry Reservoir, 1990

Species	West side of reservoir			East side of reservoir		
	OBS[1]	OT[2]	OTN[3]	OBS	OT	OTN
Bald eagle			1			
Golden eagle			1			
Red-tailed hawk					1	7
Prairie falcon		1				
Osprey		3	5		1	5
Ferruginous hawk	1		1	1	1	1
Swainson's hawk						1
Turkey vulture	1					
Great-horned owl						1
Cooper's hawk			1			
Sharp-shinned hawk	1		1			
Northern harrier	1	1		1		
American kestrel	1		1	2		
Total	5	5	11	4	3	15

Source: MFWP, 1991.
[1] Observed.
[2] Occupied territory
[3] Occupied territory nest.

a peak use of 54 in 1999 (table V-3). The decline has been attributed to the drop in the numbers of spawning kokanee salmon in this reach. MFWP has been planting kokanee salmon in Hauser Reservoir in hopes of restoring the kokanee salmon population.

Furbearers, Small Mammals, Reptiles, and Amphibians.—Beaver and otter are common on the WMA. Recreational trapping of beaver occurs along the river. A bat house was erected along a side channel in 1992 and is monitored for use. An inventory of mammals, reptiles, and amphibians, conducted by MFWP in 1983, revealed a total of 81 vertebrate species.

Table V-3.—Bald eagle census
Canyon Ferry Dam to Hauser Dam (approximately 14 miles)

Month/week	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
September											
Last week							4	19	5		
October											
1st week	10			18	15	18	15	48	8	40	
2nd week	9	19	11	32	25	38	33	53	23	53	
3rd week	12	17	14	N/A	21	42	69	104	46	103	52
4th week	20	25	13	47	25	65	59	139	44	143	29
5th week	N/A	28	19	52	52				81		
November											
1st week	6	31	19	62	111	67	81	225	137	97	71
2nd week	13	54	48	53	129	115	194	258	200	121	145
3rd week	[1]	38	30	54	109	137	242	200	235	164	190
4th week	[1]	20	52	34	66	122	225	65	160	184	197
5th week	6	N/A		N/A	64	80				220	
December											
1st week	12	31	34	25		21	237	56	101	302	203
2nd week		8		15			162	49	81	169	132
3rd week							111	42	69	73	
4th week							70	12	24	29	
5th week							53				

Note: The census is conducted every Thursday at approximately the same time of day (depending on the weather). Data outlined in this table indicate past arrival and departure times for bald eagles in the Canyon Ferry/Hauser Dam area.

[1] The third and fourth weeks in November were inconclusive because of heavy amounts of fog.

Quantitative surveys of furbearers or small mammals have not been conducted in the WMA or the reservoir. Beaver are known to inhabit areas of suitable habitat, which include Duck Creek, Confederate Gulch, Magpie Creek, and Beaver Creek. Other mammals common to these same areas are raccoons and mink. Coyote populations are stable, while fox have increased with the advent of agricultural development and human control of coyotes.

Species of Special Concern.—The bald eagle is the only federally listed threatened or endangered species associated with Canyon Ferry Reservoir. In addition to nesting, which occurs at one area on the west shore of the reservoir, bald eagles concentrate in the 14-mile reach of the Missouri River between Canyon Ferry Dam and Hauser Dam. Bald eagle use of both shores of Canyon Ferry Reservoir has also been documented through the use of radio-tagged eagles. The seasonal closure of Bald Eagle Drive during eagle migration will be maintained when bald eagle populations are numerous enough to justify such closure.

Reclamation prepared a report about bald eagles to facilitate informed decisions about land use and to promote conservation of the species and its habitat. The report, *Montana Bald Eagle Management Plan, July 1994*, was a cooperative effort among eight Federal agencies, the State of Montana, and the Confederated Salish and Kootenai Tribes. The management goal for the State of Montana is to facilitate growth of the eagle population until the number of viable bald eagle breeding peaks. Then, the goal is to provide secure habitat to maintain a viable, healthy, and self-sustaining population, as close to peak levels as possible, in perpetuity. To reduce disturbance to concentrations of bald eagles, selected areas have been closed during the period that these concentrations exist. Riverside Viewing Area was established to limit conflicts with eagles and to provide interpretive information. Riverside Campground and Eagle Bay Drive are closed from October 15 to December 15, with the closure extending to December 31 if the eagle count remains above 50 individual eagles. Restrictions on the use of the river are also in place. Eagle numbers in this area have recently fallen in response to a decline in kokanee salmon stocks. The land closures will be lifted when the eagles are not concentrated in the area, and eagles numbers will be monitored to determine if seasonal concentrations again occur. In this case, access will again be restricted to allow the migratory populations to feed undisturbed on the salmon runs. Figure V-12 shows bald eagle closure areas.

MFWP has been planting kokanee salmon in Hauser Reservoir in hopes of restoring its population.

Ferruginous hawks are a State of Montana species of special concern. They inhabit both sides of Canyon Ferry Reservoir.

Environmental Consequences

It is assumed, for the environmental analysis portion of this report, that recreational use at Canyon Ferry will increase, regardless of which alternative is chosen. Impacts to the affected (existing) environment are discussed from a programmatic standpoint because exact construction activities are not known at this time. All that is known is that a particular activity might occur.

Fish.—Fisheries resources within Canyon Ferry are managed by the State of Montana. Fisheries management changes, other than those recommended by the State in its recently released *Montana Warmwater Fisheries Management Plan, 1997-2007*, were not addressed in this RMP.

Alternative A.—Alternative A would have no impact on the fisheries within Canyon Ferry Reservoir. Although this alternative does not include new boat ramps or upgrades to existing boat ramps, increases in fishing pressure are expected. The State's management plans through the year 2007 account for potential increases in fishing pressure.

Alternative B.—Implementing this alternative would lead to increased fishing pressure. The installation of new boat ramps would disperse existing and future use over a larger area. Fisheries enhancement projects, if undertaken, would have a positive effect.

Alternative C.—Same as Alternative B, except for potential off-reservoir development, which would be addressed in separate National Environmental Policy Act (NEPA) documents when locations are known.

Wildlife.—Any of the three alternatives would affect primarily grassland and upland shrub areas. Thus, species such as antelope and deer that use this habitat would be affected most. Waterfowl, shorebirds, and other wildlife that use wetland and riparian areas would be affected least. Cooperative efforts with a local Pheasants Forever chapter would continue under all the alternatives. These efforts will benefit pheasant and songbird populations over the long term.

None of the alternatives would affect either federally listed threatened or endangered species. This is a programmatic document, and specific actions are not known at this time. When specific actions are planned and designed, site-specific NEPA compliance will be accomplished. Compliance will include the Endangered Species Act, Migratory Bird Treaty Act, and other acts and Executive orders, as applicable.

Alternative A.—Except for the Silos area, this alternative proposes no new construction around the reservoir. This alternative has both positive and negative impacts. Impacts associated with construction of new campgrounds would be less than those associated with the preferred alternative, but, on the other hand, this alternative does not provide for any increase in levels of use. When the level of recreational use exceeds the carrying capacity of recreation facilities, use will overlap into adjacent areas. This will negatively affect upland areas and associated wildlife. In addition, this alternative does not address erosion control and ORV use, which will continue to affect wildlife through loss of habitat.

Canyon Ferry Reservoir
Bald Eagle Land Closure

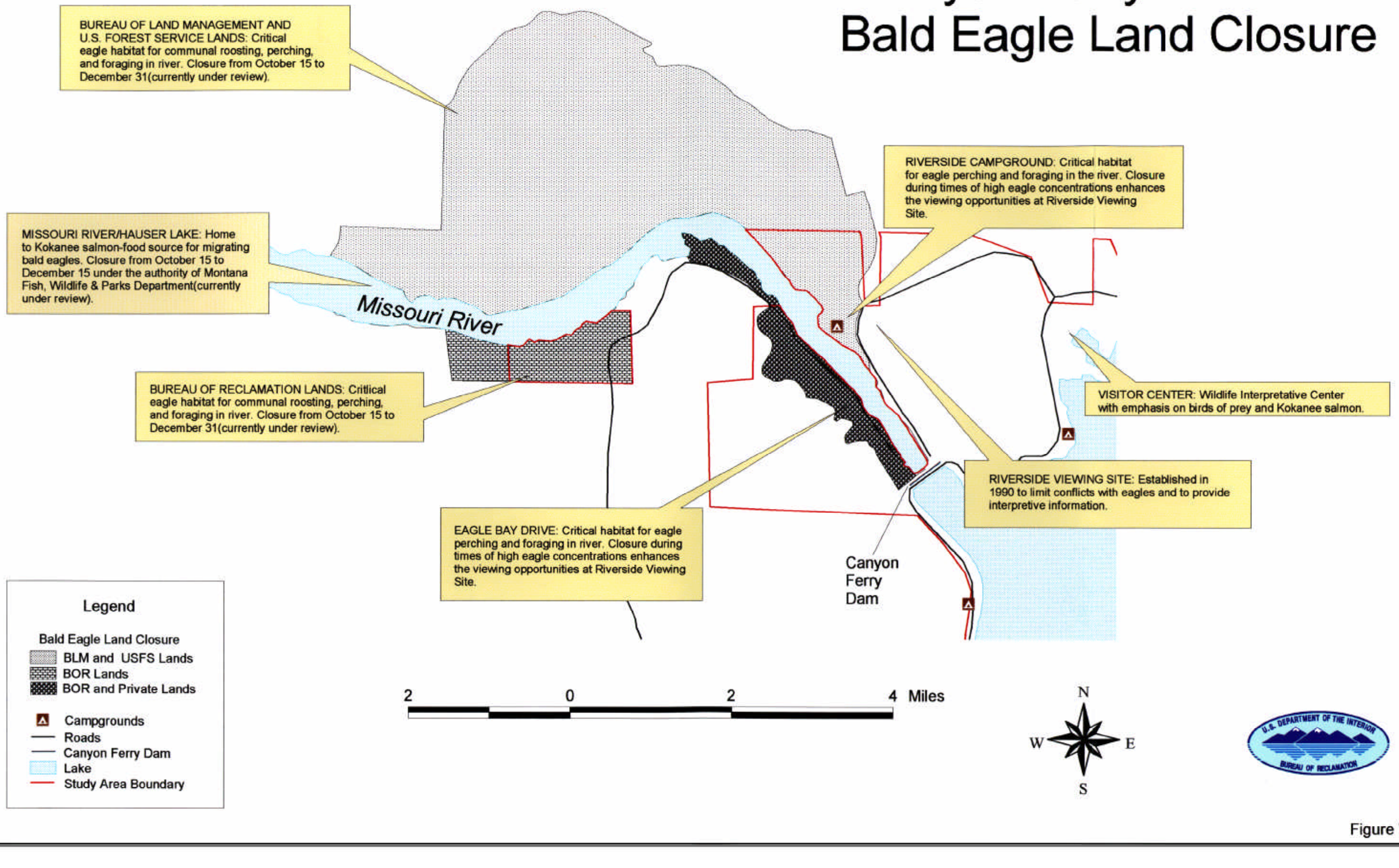


Figure V-12

Alternative B.—Overall, the effects of this alternative would be positive from a wildlife perspective. This alternative would reduce habitat by a very small amount. The loss of habitat is associated with the day-use and overnight camping area to be constructed at Silos, the area affected by construction of trails, moderate campground expansion at White Earth, development of campgrounds and day-use areas at Confederate Bay, and the installation of a boat ramp. The Silos area is already being used by recreationists, so the net loss of habitat to wildlife would be negligible. The trails and boat ramps can be constructed to minimize habitat damage. Overall, an ORV policy and an erosion-control program would have positive effects on vegetation and, thus, wildlife habitat in general.

Maintaining the closure of Eagle Bay Drive during the fall migration will ensure that the eagles will continue to feed and perch in the areas adjacent to the road.

This alternative includes identifying opportunities for wildlife enhancement.

Alternative C.—The effects of this proposal would be similar to those addressed in Alternative B.

Cumulative Impacts

Fish.—There would be no cumulative impacts to the fisheries over the long term.

Wildlife.—As stated earlier, it is assumed that recreation use at Canyon Ferry will increase in the future regardless of which alternative is selected. Wildlife may be negatively impacted, not only as a result of direct loss of habitat (facility construction, trails, etc.), but increased human presence may tend to push certain wildlife to the foothills and mountains outside the management area.

Mitigation

This RMP/EA is not intended to cover site-specific impacts. Once specific plans are known, additional NEPA compliance will be completed. At that time, specific mitigation will be developed.

RECREATION

Affected Environment

Reclamation has jurisdiction over and manages, among other things, public recreation on land and water within the study area, pursuant to Public Law (P.L.) 105-277. At elevation

3797 feet, the area within the take-line[8] consists of 33,500 water surface acres and 9,360 land acres. This area is available for recreation use. Of the 9,360 land acres, 1,000 acres have been developed for public use, and 141 acres have been reserved for cabin lease lots. The remaining acres are undeveloped and used for unconfined and dispersed recreation such as hunting and hiking. Canyon Ferry Reservoir is approximately 19 miles long and has a shoreline of 96 miles. The MFWP, which manages the WMAs in the southern part of the reservoir, is responsible for recreation management within the WMAs.

According to a 1999 travel fact sheet prepared by the University of Montana (http://www://forestry.umt.edu), the State of Montana hosted 9.4 million out-of-State visitors. This was up 2 percent from 1998. A 1998 report published by the University of Montana entitled, *Nonresident Summer Travelers to Montana: Tourism Region Report*, stated that 49 percent of the nonresident travelers visited the Gold West Country Region concurrently with other regions within the State. Canyon Ferry Reservoir and the surrounding area is within the Gold West Country Region.

The reservoir area offers both residents and nonresidents a wide variety of recreation facilities and opportunities. There are a total of 13 designated campgrounds and 12 designated day-use areas located primarily in the northern end of the reservoir. Table V-4 shows the designated public use recreation areas managed by Reclamation and the facilities and services available within each developed area. The facilities managed and paid for by private concessionaires are not included in table V-4. A list of facilities, goods, and services provided by concessions is documented later in this section. Figure V-13 shows developed recreation areas at Canyon Ferry Reservoir. There are a total of 233 campsites at the 13 designated campgrounds. There are a total of 133 day-use sites at the 12 designated day-use areas.

Canyon Ferry Reservoir is the largest of a series of three reservoirs located on the Missouri River in the vicinity of Helena, Montana. The other two reservoirs, Holter and Hauser, are both located downstream from Canyon Ferry Dam. Depending on local reservoir conditions (e.g., reservoir elevation and crowding), recreationists travel to either of these reservoirs to find the best environment for their recreation activities. Although the water-based recreation opportunities at each reservoir are similar, Canyon Ferry Reservoir offers substantially more public recreation facilities than either Hauser or Holter. Canyon Ferry has adequate recreational access to its shoreline, while Hauser and Holter have limited public access.

According to a 1999 Statewide boater survey conducted by MFWP, the Canyon Ferry/Hauser/Holter series of reservoirs, as well as Flathead and Fort Peck Reservoirs, receive the

[8] Take-line refers to the lands immediately adjacent to and under Canyon Ferry Reservoir that the Federal Government acquired for the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program.

Table V-4.—Existing recreation facilities

Facilities	White Earth	Silos	Riverside	Jo Bonner	Indian Road	Hellgate	Goose Bay	Fish Hawk	Court Sheriff	Cottonwood	Confederate	Chinamen's	**Campgrounds**	Shannon	Sandy Beach	Overlook	Orchard	Mahogany Cove[1]	Lorelei	Lewis and Clark	Crittendon[2]	Chalet	Cemetery Island[1]	Cave Bay	**Day-use areas**	Total
Campgrounds																										
Marked campsites		52	38			72			42			45														249
Unmarked campsites	38	11		28	32	27	43	5		8	16							3								211
Shelters		2	3			8																				13
Picnic tables	36	68	36	28	21	94	9		44	1		45						2								384
Fire rings/grills	47	63	25	29	18	96		1	42			45														366
Picnic sites																										
Picnic sites			1			10		5	2					8	3	14	7		6	10	15	1		3		85
Group picnic sites		1				2																1				4
Picnic shelters																2				2						4
Picnic tables		5	3			18			1							2	7		5	5		6	3	3		58
Fire rings/grills		2				7													2	2		3		1		17
Solid waste																										
Garbage cans		10		9	4	7								2								4				36
Dumpsters	2	3	2			5			2			3										1				18
Sewage and water																										
Flush toilets						1																				1
Vault toilets	4	8	6	2	2	13	2	1	6	2	2	5		2	1	2	1	1	1	2	1	2	1	1		68
Water – hand pumps		1																								1
Water – spigots	3	5	3	1		4			5			3														24
Sanitary dump stations[3]																										0
Boating/swimming																										
Boat docks	1	2	1	1		2						1		1												9
Surfaced boat ramps	1	3	1			2								1												8
Dirt surface boat ramps		1		1			1		1			1														5
Designated beaches				1		1			1			1					1		1	1						7
Undesignated beaches	3	4	1			3	5				2			1	1			1		1	2	1	2	1		28
Handicapped																										
Boat ramps			1																							1
Fishing platforms			1		1																					2
Walkways		2	1		1									1												5
Toilets	4	7	2	2	2	7	2		4		2	4		2						2						40
Parking spaces		2												1												3

[1] Denotes boat access only.
[2] Most facilities at Crittendon were burned in the Buck Snort fire.
[3] Dump stations are provided by private concessions at Kim's and Goose Bay Marinas.

heaviest boating use in the State. Canyon Ferry Reservoir is in MFWP Region 3, which encompasses the southwestern portion of the State. This region receives 21 percent of the total motorized boating use in the State.

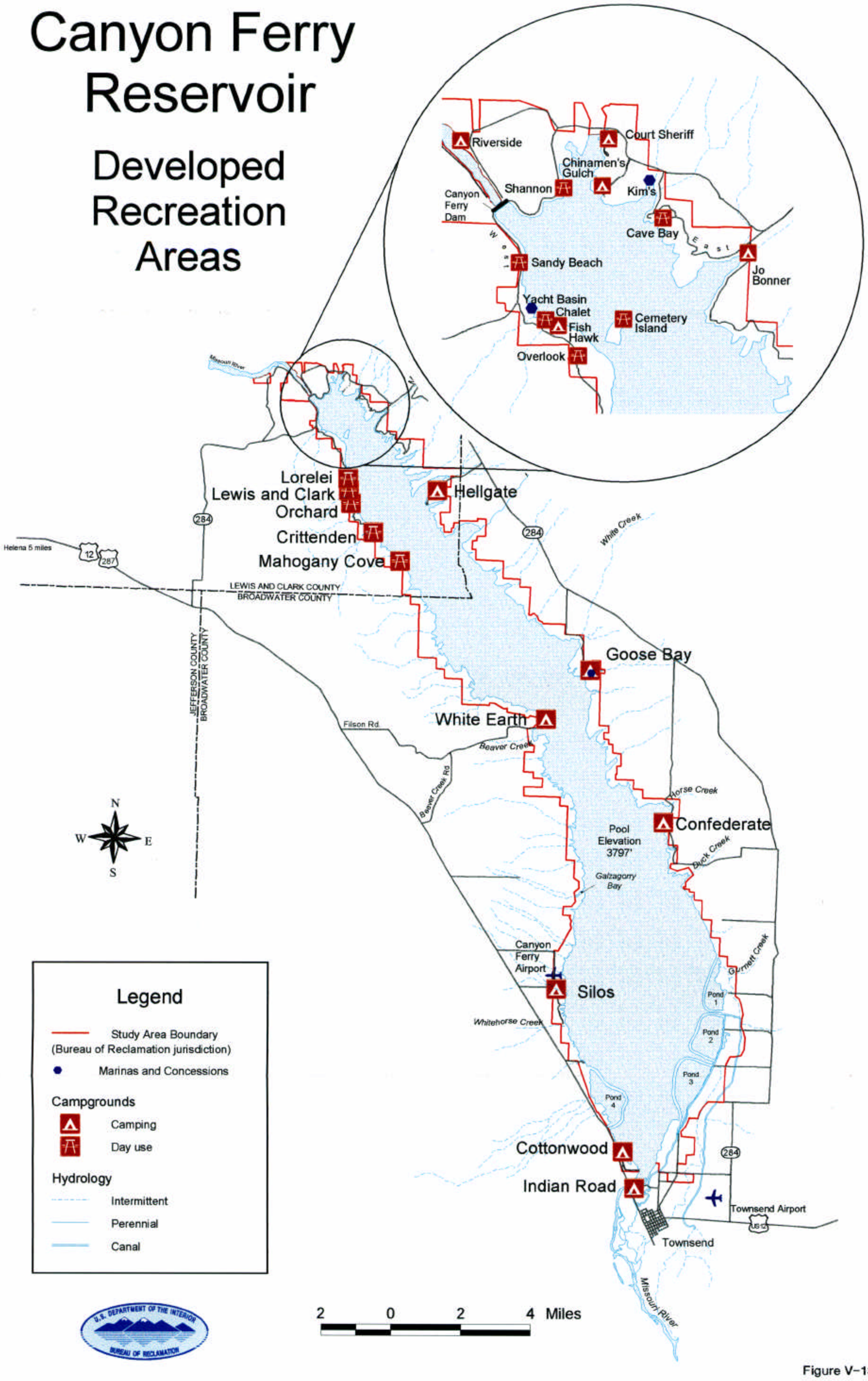
The reservoir has three commercial concession operations that provide a variety of services to the public. Figure V-13 shows locations of concession operations. The three concessions are Yacht Basin Marina, located in the northwestern portion of the reservoir; Kim's Marina, located in the northeastern portion of the reservoir, near Cave Bay; and Goose Bay Marina, located between the north and south ends of the reservoir on the eastern shore. The concessionaires offer a wide variety of services, including boat and motor rentals; mooring spaces; boat and trailer storage; boat launch ramps; public marina and docking; fueling; public campgrounds for RV, tent, and trailer camping; sales and rental of outdoor sporting equipment; and food service. A list of improvements made to the respective concession operations is included as appendix F. Reclamation has oversight responsibility to ensure that the terms and conditions of the concession permits are adhered to and that the concessions are operated pursuant to Reclamation's *Concessions Policy, Directives and Standards*. Reclamation will develop a Commercial Services Plan (CSP) for Canyon Ferry Reservoir. The CSP will assist Reclamation in preparing bid packages for the issuance of new concession operations upon expiration of existing concession contracts.

The Coast Guard Auxiliary (CGAUX) routinely patrols Canyon Ferry Reservoir from Memorial Day through Labor Day, although search and rescue activities may be authorized outside this time period. During the summer recreation season of 2000, the CGAUX conducted 33 patrols, resulting in 23 assists. These assists included towing disabled boats, righting sail boats, searching for a lost personal watercraft (PWC) operator at night, and assisting country, State, and Federal agencies during the fires of 2000. This experience gives the CGAUX valuable insight concerning boating use on the reservoir and associated safety concerns. The CGAUX has installed a VHF radio base station at Yacht Basin Marina. This provides coverage from Yacht Basin to Silos Recreation Area. However, many boats do not have radios; therefore, this system is not completely effective. See appendix G for a list of initiatives which the CGAUX has implemented or participated in to support boating safety at Canyon Ferry Reservoir.

To assist in determining the overall affected recreation environment (existing baseline condition), it is important to understand what the public perceives the existing environment to be. Based on the public information collected during the planning and NEPA process, the public identified certain issues and concerns which can be considered their perceptions of the present conditions at Canyon Ferry Reservoir. The public believes that the reservoir lacks a sufficient number of quality recreation facilities and opportunities and that the existing facilities are in need of repair. In addition, some of the existing facilities need to be redesigned because the buffer area between individual day-use and campground sites is not adequate to avoid the sights and sounds of others using the area. Some user conflicts were identified by the public.

Canyon Ferry Reservoir

Developed Recreation Areas



Legend

- Study Area Boundary (Bureau of Reclamation jurisdiction)
- Marinas and Concessions

Campgrounds

- Camping
- Day use

Hydrology

- Intermittent
- Perennial
- Canal

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Figure V-13

The public expressed a concern that there were not enough no wake zones to reduce user conflicts at swim beaches, developed day-use and campground areas, boat launch ramps, and fishing bays. The public is concerned that there are not enough improved, adequately maintained, and signed access roads to the various developed areas, especially to the southern part of the reservoir. The public is concerned about the safety of boaters on the reservoir during inclement weather.

The normal summer recreation season typically runs from Memorial Day to Labor Day. The heaviest recreation use occurs on these holiday weekends, the Fourth of July weekend, and other weekends throughout the summer. Several factors may influence the visitation at the reservoir and include, but are not limited to, water surface elevations, viewing watchable wildlife, fees, fishing opportunities, conflicts and crowding, construction activities, economy, and weather conditions. Visitation numbers that have been collected for Canyon Ferry Reservoir have been inconsistent and incomplete. Visitation at the 12 nonfee day-use areas located around the reservoir usually has not been counted. In addition, the historic visitor counts have not included winter visitation (i.e., ice fishing and other winter-related activities). Appendix E contains several bar graphs that depict annual visitation at seven of the campground areas at Canyon Ferry Reservoir over a 7-year period; a summary graph depicting annual visitation at campground and group-use areas over a 7-year period; a bar graph depicting fees collected and expenditures related to recreation; and supporting data, which was used to create the bar graphs.

MFWP estimates that there was a total of 94,510 angler visitor days to Canyon Ferry Reservoir in 1997 (last reporting year). This figure includes only licensed anglers and does not include anglers below 12 years of age because licenses are not required for this age group. Visitor use estimates are calculated only from licensed anglers. An angler day is considered to be one visit by one angler per day at a specific location for the specific purpose of fishing (i.e., it does not matter if a person stays for 1 hour or 18 hours, it still would be counted as one angler day). Of the 94,510 visitors reported in 1997, 89,247 were residents of Montana, and 5,263 were nonresidents. Of the total, 39,036 angler days were attributed to winter fishing. Of the 39,036 winter visitors, 38,830 were residents, and 206 were nonresidents.

In a 1998 Recreation Economics Analysis prepared by Reclamation, it was estimated that the visitation at Canyon Ferry Reservoir was 220,000 visitors annually. Since the figure does not include winter fishing visitation, Reclamation has added 39,036 angler days to the 220,000 estimated visitation to arrive at a total of 259,036 visitors. Therefore, baseline annual visitation for this RMP/EA is estimated to be 259,000 (rounded to the nearest thousand) for all activities.

According to a 1999 Canyon Ferry Recreation Study conducted by the University of Montana's Institute for Tourism and Recreation Research during the 1999 summer recreation season, the most popular activities of the 774 people interviewed at Canyon Ferry Reservoir were

swimming, sunbathing, picnicking, walking, hiking, boat fishing, bank fishing, photography, wildlife observation, power boating, jet skiing, camping (RV/automobile and tent), tubing, and water skiing. The public also participates in hunting, sailboarding, canoeing/kayaking, sailing, studying nature, horseback riding, biking, using ORVs, and visiting historic sites. Even though sailing is a popular activity in the northern part of the reservoir, the 1999 recreation study did not specifically identify sailing in its report. Sailing was not identified because the university limited its survey to visitors to 19 of the 25 day-use or campground areas. Sailors primarily moor their sailboats at either Yacht Basin or Kim's Marina; therefore, they were not counted. Table V-5 shows the 15 most popular recreation activities, average participation levels for all sites combined, and the recreation areas where the specific activity is the most popular.

Table V-5.—Activities, average participation levels at all sites combined, and area where the activity is the most popular

Activity	Average participation level (%)	Most popular area	Use at most popular area (%)
Swimming	52.11	All day-use areas	
Auto/RV camping	47.72	Hellgate	71.0
Sunbathing	43.21	All day-use areas	
Boat fishing	40.08	Goose Bay	74.0
Sightseeing	36.84	Kim's Marina	64.7
Picnicking	35.70	Confederate Bay	50.0
Walking	33.80	Chinamen's Gulch	45.3
Power boating	32.74	Kim's Marina	62.7
Bank fishing	26.69	Confederate Bay	58.3
Wildlife viewing	26.38	Chinamen's Gulch	35.8
Tubing	22.40	Hellgate	31.0
Photography	21.97	Court Sheriff	28.8
Water skiing	21.13	Kim's Marina	37.3
Tent camping	19.60	Hellgate	36.0
Jet skiing	11.51	Hellgate	17.0

Source: University of Montana, Institute for Tourism and Recreation Research, 1999.

Although certain activities are more popular at day-use areas than at campground areas (e.g., swimming and sunbathing), the table reflects the average participation levels at both 100 percent because of the multiple responses of individuals (i.e., someone who was swimming at a site may also have been sunbathing, walking, camping, sightseeing, etc.). It is assumed that the participation levels for each of the activities at the other six recreation areas are essentially the same.

As stated above, the participation level percentages represent multiple activity responses from each individual visiting the reservoir. The 1999 study did not distribute the total visitation by activity. The *1998 Canyon Ferry Recreation Economics Analysis Report*, prepared by Reclamation, used a 1986 Montana on-site survey to show activity percentage shares. The assumption has been made that the percentage shares have not changed over time. Table V-6 shows the percentage shares for several of the activities shown in table V-5.

Table V-6.—Percentages of recreation activities at Canyon Ferry Reservoir (1986)

Recreation activities	Percentage share
Fishing	13.2
Camping	10.7
Relaxing (other)	11.1
Power boating	9.1
Picnicking	8.1
Swimming	6.9
Sunbathing	6.3
Scenic viewing	5.8
Walking/hiking	5.3
Water skiing	4.8
Photography	2.3
Visit historic sites	1.5
Other activities	14.9
	100.0

Source: Reclamation Recreation Economics Analysis, 1998.

The 1999 study involved the collection of data from recreationists who visited 1 of the 19 day-use or designated campgrounds at the reservoir. Only 19 of the 25 recreation areas were surveyed. Among other things, the study objectives were to determine:

- **R** Sociodemographic characteristics of on-site users
- **R** On-site activity participation levels
- **R** Satisfaction with existing facilities and identification of needed facilities

- **R** Potential and existing conflicts

- **R** Estimates of current use levels at the 19 recreation areas surveyed

More importantly, the results of the 1999 study were compared to a similar study completed by the University of Montana in 1995. Both studies revealed the areas where the site attributes[9] were high, but the satisfaction levels were low. Studies of this nature allow managers to focus on correcting identified problems at those areas that visitors feel have enough attributes for them to make return visits. Once problems are corrected, visitor satisfaction for the area increases. The 1999 study revealed that the visitors were more satisfied with the sites they visited in 1999 than those same sites when visited in 1995.

There are a total of 18 developed or unimproved boat ramps located at the reservoir. The usability of the boat ramps throughout the recreation season has to do with the elevation of the reservoir, the types of boats being launched from trailers, wind and wave action, topography, and soil composition below the toe of the ramp. Taking into consideration the factors just mentioned, the usability of the boat ramps will decrease as the elevation of the lake falls below a level that is 3 feet[10] above the end of the ramp. An elevation that is 3 feet above the end of the ramp is considered the minimum depth needed to safely launch watercraft from trailers. Below that elevation, boaters increasingly have a harder time launching their boats. The historic average lake elevation on Memorial Day is 3787.17 feet; Fourth of July, 3793.68 feet; and Labor Day, 3788.51 feet. Table V-7 shows several boat ramp elevations. By referencing the following table, it can be seen that the listed boat ramps are usable throughout the summer recreation season when compared to the historical reservoir elevations. However, during dry water years, these ramps may become unusable as water is released downstream for other purposes sometime during the season. The degree to which the usability of the boat ramps is affected depends on how severe the water shortages are. In addition, in April and May, which is before the normal recreation season, the boat ramps may be unusable because of the early spring drawdown of the reservoir for flood control purposes. The proposed Broadwater Bay Deepening Project construction at the Silos Recreation Area will provide boating access to the reservoir when the water elevation is at 3779 feet. This will provide boating access 90 percent of the time.

The lands within the study area are closed to ORV use, pursuant to 43 Code of Federal Regulations (CFR), Part 420. According to regulations, all Reclamation lands are closed to ORV use unless otherwise designated open. No formal process has ever been initiated for legally opening Canyon Ferry Reservoir lands for use by ORVs; therefore, all lands are closed. Visitors are illegally using ORVs and ATVs on reservoir lands, especially along the eastern shore from Confederate Bay north to Canyon Ferry Dam, as well as along the western shore north of Silos

[9] For the purposes of this document, an attribute can be defined as a site condition that users feel is important to have a quality recreation experience (e.g., shower/restroom, scenery, solitude, and boat ramp).

[10] *Recreation Facility Design Guidelines*, U.S. Department of the Interior, Bureau of Reclamation, September 2002.

Table V-7.—Canyon Ferry concrete boat ramp elevations

Location	End of concrete	Usable elevation
Yacht Basin Marina	3776	3779
White Earth Recreation Area	3776	3779
Kim's Marina ramp	3776	3779
Silos, north ramp	3778	3781
Shannon Recreation Area	3782	3785
Goose Bay Marina	3781	3784
Silos, south ramp	3781	3784
Kim's Marina docks (water just entering bay at 3776)	3776	3779
Hellgate Recreation Area	3784	3787

Source: Bureau of Reclamation, MTAO.

Recreation Area. There is a significant concentration of ATV use near Hellgate Recreation Area. Figure V-14 shows locations where illegal ORV and ATV use is occurring. Uncontrolled ORV and ATV use is causing severe soil erosion and undue damage to vegetation, heritage resources, wildlife, and wildlife habitat. ORV and ATV use can also indirectly affect the water quality of the reservoir and may cause user conflicts between ORV and ATV users and other recreation visitors.

As stated earlier, the public has identified user conflicts associated with the use of the reservoir by PWCs. Traditional boaters using the reservoir for sailing, fishing, canoeing, etc., have voiced concerns about the noise and safety problems created by PWC users. In addition, camping and day-use visitors have complained about PWCs coming too close to swim beaches, boat ramps, and camping and day-use sites, and PWC users not respecting quiet hours. In addition to the conflicts between PWC users and other users, PWCs may negatively impact wildlife populations by affecting their nesting success. PWC users at Canyon Ferry adamantly defend their sport and wish to work with legislators, law enforcement agencies, and managing entities to find solutions to these identified or perceived problems. They state that more rules, regulations, and law enforcement could help significantly to control the PWC users that give the sport a bad name. In addition, the PWC industry is currently becoming more active in promoting safety and educating the public about their products.

Environmental Consequences

Alternative A.—Under the No Action Alternative, Reclamation would continue to manage facilities and public activities in accordance with its ability and authority. In the event Reclamation receives additional law enforcement authorities, or authority to impose and enforce additional rules and regulations or policies, Reclamation will do so as necessary and

appropriate. Except for the proposed recreation development at Silos Recreation Area, no new recreation facilities are expected to be developed within the study area, and future demand would not be met.

Existing management practices would allow dispersed and uncontrolled recreation use to continue. Only minimum basic visitor health and safety services would be provided. Conflicts among the various user groups would continue. As visitation increases naturally over time, and existing facilities reach their capacity limits, the quality of the recreation experience for most users will decline.

Kim's, Yacht Basin, and Goose Bay Marinas will continue to offer commercial services into the future. Upon expiration of the three existing concession contracts, issuance of new contracts will be based on Reclamation policy. Except for the possibility of developing a concession operation at Silos, commercial services to the public will probably not change. The visitor experience may gradually deteriorate as increasing numbers of visitors compete for the same use areas, especially in the northern portion of the reservoir. The southern and southwestern portions of the reservoir would continue to be underused; however, if it is determined that a small-scale commercial development is feasible at the Silos Recreation Area, services to the public would be enhanced from that development. Since a commercial operation at Silos will not be constructed if it negatively impacts existing concessionaires or other commercial operations in the immediate vicinity, there should be no financial impact to existing commercial operators.

Maintenance costs associated with a potential marina operation at Silos may be high because of high winds and other environmental factors, such as ice jams. Maintenance costs associated with construction of a deep water bay at Silos may increase over time because of the probability of silting. Siltation is caused by waves eroding the points of land on either side of Broadwater Bay. The waves may take material from the points of land and deposit it in the mouth of the bay. This can be controlled by protecting the points of land by various methods, including but not limited to, riprap, gabions, or slope modification. This erosion is now occurring at some of the bays on the reservoir, but the amount of siltation depends on how protected the shoreline is from wave action and the material composition of the shoreline.

Alternative B.—A moderate increase in the number of recreation opportunities and facilities could be provided under this alternative as compared to no new developments and opportunities described in Alternative A. Restrictions on the types of activities allowed within the study area would be imposed, and the areas where authorized activities could take place would be identified.

Implementing a comprehensive planning strategy, such as closing certain roads and fencing the exterior boundary of the reservoir, would prevent uncontrolled vehicle access and some dispersed recreation use. Those individuals who desire this type of unconfined and

Canyon Ferry Reservoir

Unauthorized Vehicle Use of Reclamation Lands

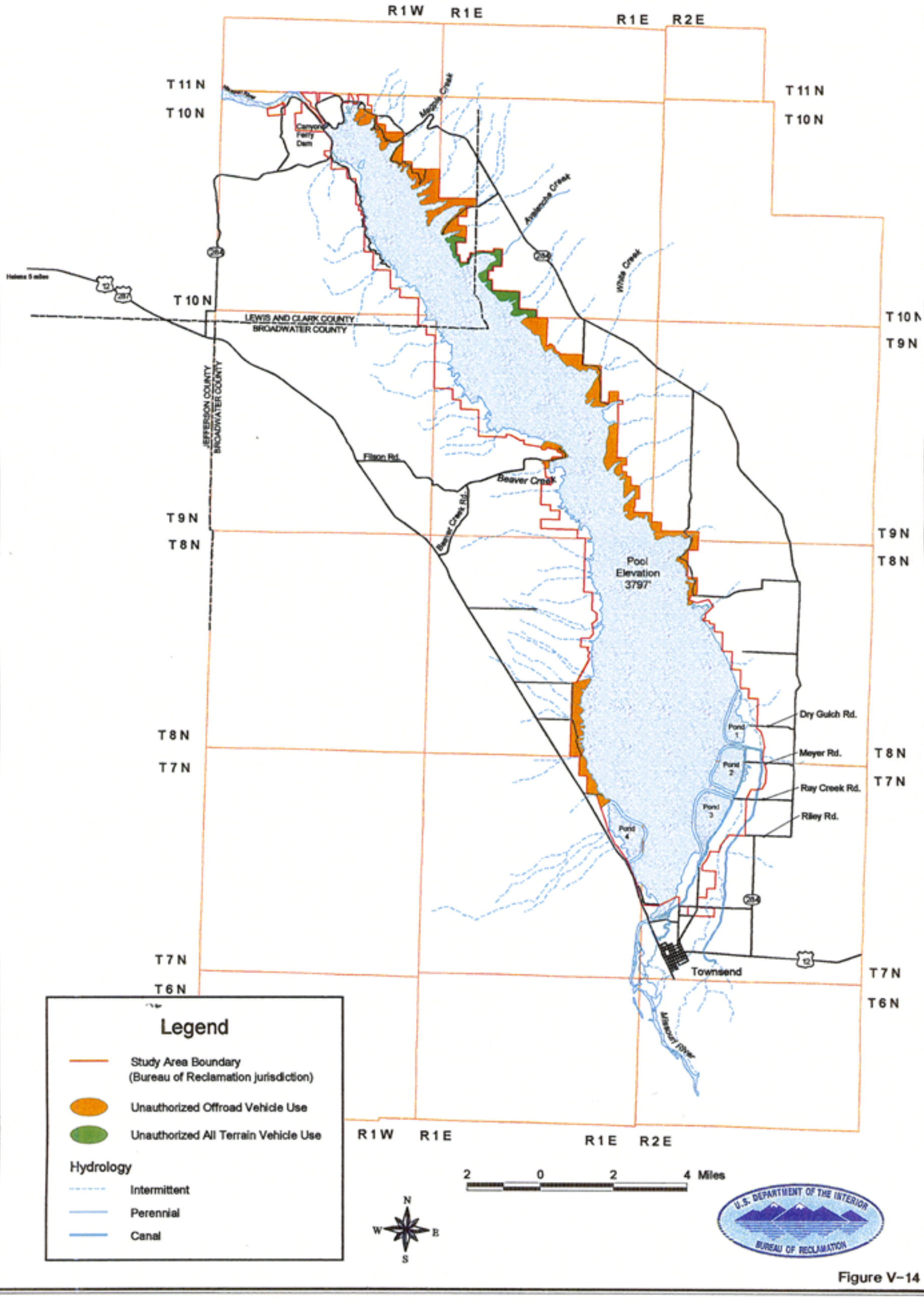


Figure V-14

unregulated experience would be displaced to areas where those opportunities are available outside the study area or to other areas within the reservoir area that can be accessed by vehicles on roads that remain open.

Redesigning and upgrading existing recreation areas, constructing new facilities, developing trails, interpretation of the natural environment, and fish and wildlife enhancement efforts would increase the recreational opportunities available to the public. Providing additional facilities and opportunities would help alleviate the feeling of overcrowding that may occur in the future as the social, physical, environmental, and facility carrying capacity levels are reached or exceeded. Providing an adequate number of new facilities and opportunities will have a positive effect on the quality of the visitor experience.

By providing signs, sanitary facilities, and campground and day-use security, and by controlling access, the health and safety of visitors will be protected. By controlling the various recreation uses, user conflicts will decrease.

Construction of trails and other developments may displace hunters to other areas; however, closing areas to ORV and ATV use, closing certain roads, and controlling visitation use would probably offset any negative impacts to hunters.

Because of the increase in the number and types of recreation facilities and opportunities, visitor use and satisfaction would probably increase. However, as visitor use increases, the number of visitors experiencing a feeling of overcrowding may increase, especially among historic users of the reservoir. Dispersing user groups to the various recreation sites within the reservoir area may minimize the feeling of overcrowding. In addition to dispersing users, the vast land and water areas within the study area will accommodate increased visitor use without creating a feeling of overcrowding for most visitors.

Closing Canyon Ferry Reservoir to ORV and ATV use would decrease user conflicts between those users and other recreationists. ORV and ATV users would be restricted to designated access roads or displaced to areas outside the study area that legally allow those uses to occur.

Providing no wake zones near campgrounds, boat ramps, fishing bays, day-use areas, swimming areas, and environmentally sensitive areas would deter PWC and other watercraft from speeding in these areas. This would reduce user conflicts and displace certain watercraft users from these areas to other areas on the reservoir and to water bodies outside the study area.

A new concession operation may be established at Silos Recreation Area based on the feasibility of constructing facilities that may be needed to meet a certain level of public demand. Since a commercial operation at Silos will not be allowed if it negatively impacts existing concessionaires or other commercial operations in the immediate vicinity, there should be no financial impacts to existing commercial operators. Construction of a deep water bay at Silos would provide additional opportunities for the public and a safe harbor for boats. Maintenance costs

associated with a marina operation at Silos may be high because of high winds and other environmental factors, such as ice jams. Maintenance costs associated with construction of a deep water bay at Silos may increase over time because of the high probability of silting.

Kim's, Yacht Basin, and Goose Bay Marinas will continue to offer commercial services into the future. Upon expiration of the three existing concession contracts, issuance of new contracts will be based on Reclamation policy that includes a competitive bid process. Except for the possibility of developing a concession operation at Silos, commercial services to the public will probably not change. Increased recreation opportunities and facilities should increase visitation over time and enhance the opportunity for a concessionaire to make a profit.

Interpretive and educational information would be made available to the public; therefore, the public would have a safer and more enjoyable recreation experience.

If fees are charged, they would be comparable to fees charged at other areas offering the same amenities. Some individuals who do not desire to pay fees for use of facilities will be displaced to other nonfee areas.

Because the toilets cannot be pumped at this time, upgrading existing facilities and providing additional recreation opportunities on Cemetery Island will indirectly increase the sewage problem associated with public use of the two restrooms.

Alternative C.—A maximum number of recreation facilities and opportunities would be provided under this alternative as compared to the number of facilities and opportunities described in Alternatives A and B. Impacts expected under this alternative are similar to those for Alternative B, except for the possible increased impacts directly related to the construction of additional campgrounds, day-use sites, trails, and the Silos concession.

By maximizing recreation facility development and providing increased recreational opportunities, carrying capacity limits may be exceeded and reach the point that user conflicts increase. The quality of the recreation experience may, therefore, decrease for some users. As visitor use increases, the health and safety of visitors may be compromised by overcrowding, competition for available space, and overuse and abuse of existing facilities.

However, environmental resources protection and public health would improve with the installation of fish cleaning and sewage effluent pump-out stations throughout the reservoir area.

Some users who desire a more unconfined and uncontrolled recreation experience may be displaced to other areas outside the study area, but the loss of those users will be offset by increases in visitors attracted to increased opportunities and facilities.

By providing signs, sanitary facilities, and campground and day-use security and controlling access, the health and safety of visitors will be protected. By controlling the various recreation uses, user conflicts will decrease.

Closing Canyon Ferry Reservoir to ORV and ATV use would decrease user conflicts between those users and other recreationists. ORV and ATV users would be restricted to designated access roads or displaced to other areas outside the study area.

Providing no wake zones near campgrounds, boat ramps, fishing bays, day-use areas, swimming areas, and environmentally sensitive areas would deter PWC and other watercraft from speeding in these areas. This would reduce user conflicts and displace certain watercraft users from these areas to other areas on the reservoir or other water bodies outside the study area.

Kim's, Yacht Basin, and Goose Bay Marinas will continue to offer commercial services into the future. Upon expiration of the three existing concession contracts, issuance of new contracts will be based on Reclamation policy that includes a competitive bid process. Except for the possibility of developing a concession operation at Silos, commercial services to the public will probably not change. Increased recreation opportunities and facilities should increase visitation over time and enhance the opportunity for a concessionaire to make a profit.

Interpretive and educational information would be readily available; therefore, the public would have a more enjoyable recreation experience.

The fees charged would be comparable to fees charged at other areas offering the same amenities. Some individuals who do not desire to pay fees for the use of facilities will be displaced to other nonfee areas.

Closure of certain areas to protect the safety of other users will displace hunters to areas outside the study area.

Cumulative Impacts

The cumulative impacts of controlling unauthorized uses and restricting public access to designated areas might be the displacement of users who desire an unconfined and uncontrolled recreation experience. Therefore, visitation at recreation areas other than Canyon Ferry may increase. Visitor use is likely to increase at Canyon Ferry Reservoir, which would possibly increase visitor conflicts and resource damage if use is not controlled and monitored.

Mitigation

No mitigation is needed for closing ORV roads and ATV areas, controlling unconfined and uncontrolled recreation use, dispersing recreation use, and enhancing recreation opportunities.

Recreation facility development would complement the surrounding landscape, as much as practical, and would follow strict design and construction criteria, guidelines, and standards. Carrying capacity limits and user demand would be properly determined before major facility development occurs. Proper regulatory and informational signage would be posted throughout the area, informing the public of the rules and regulations governing the use of the federally owned lands surrounding Canyon Ferry Reservoir.

Seasonal closures of newly constructed trails may have to be initiated if trail use is determined to have a negative effect on hunters or if conflicts between hunters and other users occurs.

VISUALS

Affected Environment

Canyon Ferry Reservoir appears remote and, for the most part, undeveloped. This is partially because it is visually separated from Helena by the Spokane Hills and because it is defined to the east and west by the grass- and tree-lined slopes of the Big Belt and Elkhorn Mountains.

As visitors descend to the shoreline roads from the north into Yacht Basin, they are greeted by Ponderosa Pine-studded hills. The hills vary in their height and shape. The reservoir stretches serenely from the foreground to the distant background.

Driving from Yacht Basin along the west shore, the viewer winds along a tree-lined road, catching occasional glimpses of the reservoir and hills on the east shore. From many of the recreation sites, the cabin sites and development along the north shore are visible. The views of development at Canyon Ferry are fairly unobtrusive partly because development is masked by topography and vegetation. Views from most of the west shore looking east are of low-lying hills against the backdrop of the Big Belt Mountains.

Traveling north and east from Yacht Basin, the first major physical interruption to the character of the area is the dam itself. Even from the dam, the surrounding hillsides are largely undisturbed. Between Canyon Ferry Village and Magpie Bay, the viewer is confronted with the most heavily developed area along the shoreline.

Continuing south along the east shoreline, the viewshed is relatively undeveloped, with a broad agricultural valley stretching south and the low-lying plains and Elkhorn Mountains rising in the west. The sharply incised cliffs at White Earth are visible from the east shore. In addition, second homes, cabin sites, and large lot developments, as well as burnt areas from the Buck Snort fire, are visible from the access roads, the water, and from some of the recreation sites located on the east side.

At the south end of the reservoir, the landscape closes in around the ponds and shoreline, focusing the viewer on the water and the wildlife's abundant activity during certain times of the year. Riparian vegetation, such as willows, dominates the foreground.

Continuing along the west shore, the Big Belt and Elkhorn Mountains can be viewed from the recreation sites. The foreground is prairie grassland. Between White Earth and the end of West Shore Drive, lands descending to the reservoir are undeveloped and inaccessible. Cabin sites, Yacht Basin Marina, as well as the burnt areas from the fire of 2000, are visible from both land and water along the northwest shore.

At the time of this study, visual concerns are most evident at individual recreation sites, where a lack of vegetative and topographic screening reduces privacy and/or the recreation experience. For instance, at Jo Bonner, the maintenance yard is on an unscreened hill in full view of the recreation site. At Goose Bay Marina, lack of vegetation and other visual screening around mobile homes and trailers reduces the visual attraction of the adjacent recreation site.

From the water, retaining walls serve to detract from the natural visual quality of the reservoir. The variety of construction techniques and assortment of materials used for retaining walls has resulted in a myriad of structures.

Environmental Consequences

Alternative A.—The visual quality of the landscape surrounding Canyon Ferry Reservoir would continue to decrease because of continued ORV and ATV use of the area and because of the lack of comprehensive development criteria that would include standards that protect the visual quality of the area. Rehabilitating the burnt areas by following the Buck Snort Fire Burned Area Rehabilitation Plan and EA (see chapter VI, "Land Use – Actions" section for fire rehabilitation goals and treatment projects) will return the affected areas to pre-2000 conditions, thereby increasing the visual quality. The visual landscape as a result of the fire will affect the visual quality over the short term, but may even improve over the long term as revegetation occurs (the mosaic visual pattern left by the fire may be more appealing to the eye than the continuous forest canopy). The timeframe needed to realize a significant recovery is dependent on "mother nature" and the treatment methods used.

Alternative B.—The visual quality of the landscape surrounding Canyon Ferry Reservoir would improve because illegal ORV and ATV use would be eliminated, and a comprehensive facilities development plan would be established that protects the visual resources. Revegetation of disturbed areas, such as ORV roads, and planting vegetation that provides buffer zones (visual screening) between individual camping and day-use sites would improve the visual quality of the area. Rehabilitating the burnt areas by following the Buck Snort Fire Burned Area Rehabilitation Plan and EA (see chapter VI, "Land Use – Actions" section for fire rehabilitation goals and treatment projects) will return the affected areas to pre-2000 conditions, thereby

increasing the visual quality. The visual landscape as a result of the fire will affect the visual quality over the short term, but may even improve over the long term as revegetation occurs (the mosaic visual pattern left by the fire may be more appealing to the eye than the continuous forest canopy). The timeframe needed to realize a significant recovery is dependent on "mother nature" and the treatment methods used.

Alternative C.—The impacts under this alternative would be similar to Alternative B, except visual quality, for some users, might decrease as the ability of some specific land areas to absorb development is exceeded. However, proper site planning, before development, may offset any potential adverse impacts that increased facility development could cause.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

Recreation facility development would complement the surrounding landscape as much as is practical and would follow development criteria that would protect the visual quality of the reservoir area.

Reclamation plans to have all treatment actions for the fire management areas completed by the end of 2003.

LAND USE

Affected Environment

Current Land Use.—The land use study area includes all Reclamation lands and adjacent parcels that could significantly affect, or be affected by, public use. Figure V-15 shows land ownership patterns.

Although the ball fields and golf course located at the south end of the reservoir, near Townsend, are on Reclamation lands, they are considered autonomous and, as such, are not included in the study area. These lands are leased to the city of Townsend and do not influence Canyon Ferry management (Rick Blaskovich, Reclamation, personal communication, September 19, 2000).

Land within the study area is primarily used for public recreation and open space (figure V-16). The exceptions are:

Canyon Ferry Reservoir

Ownership

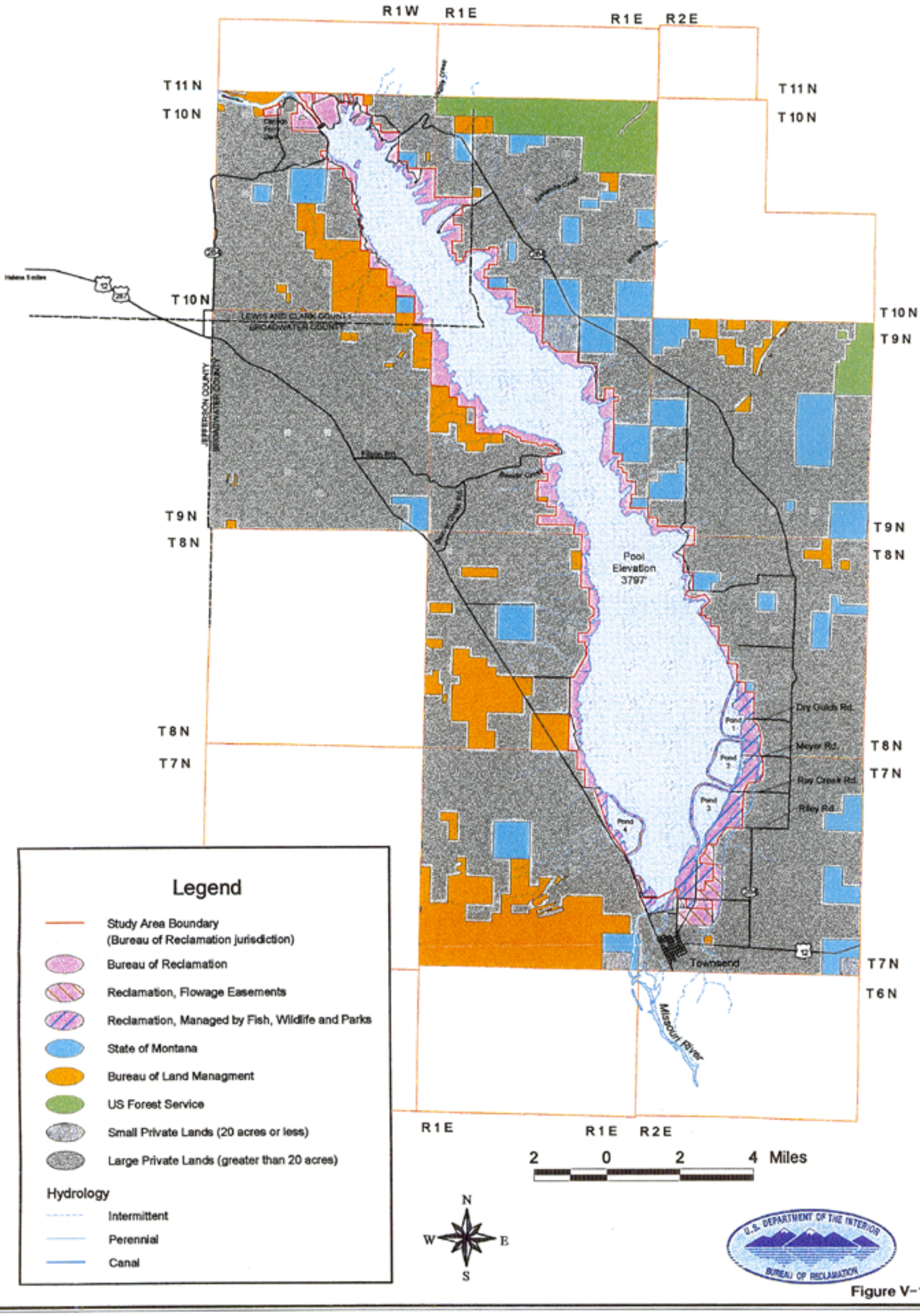
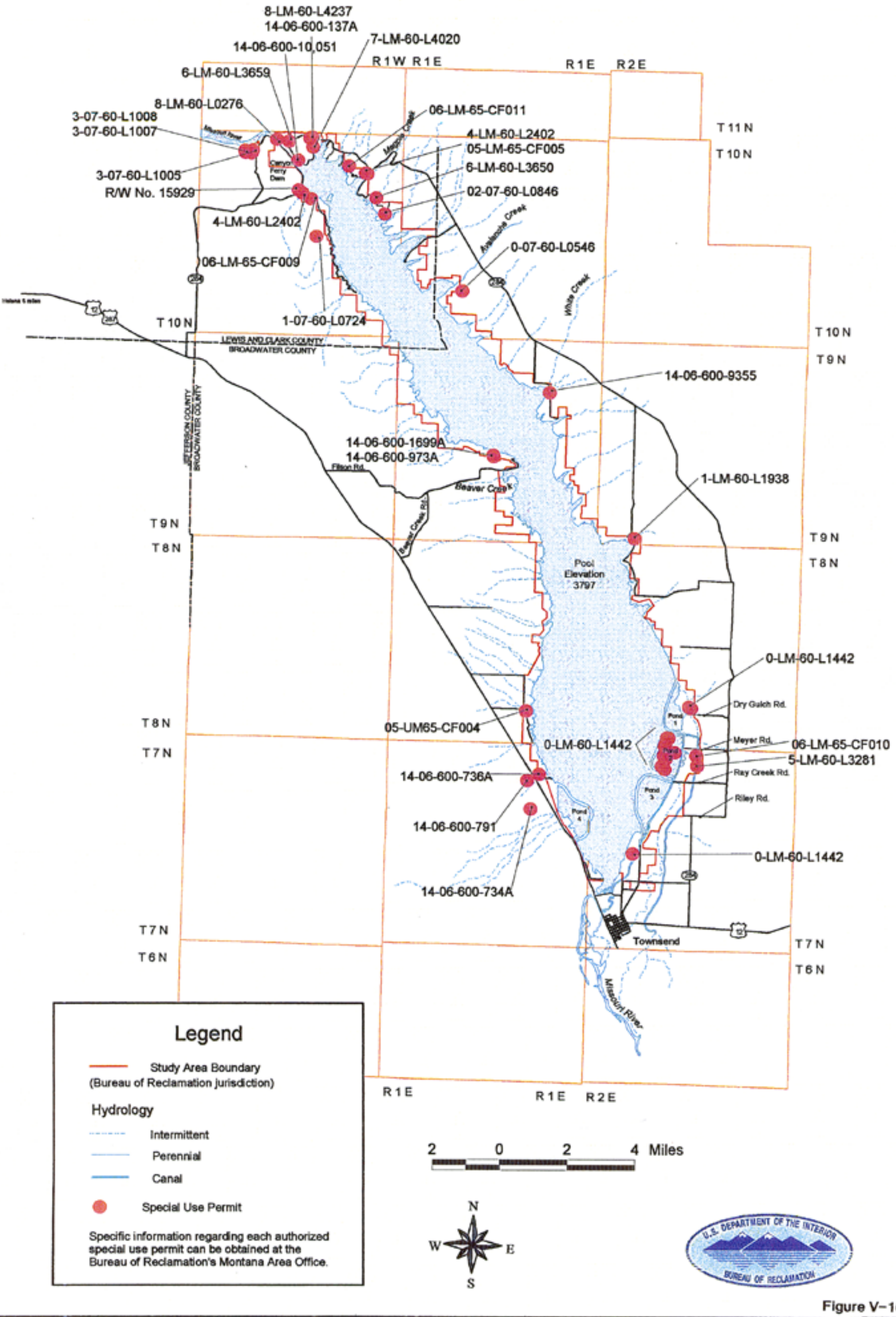


Figure V-15

Canyon Ferry Reservoir

Special Use Permits



Legend

Study Area Boundary
(Bureau of Reclamation jurisdiction)

Hydrology

- Intermittent
- Perennial
- Canal

Special Use Permit

Specific information regarding each authorized special use permit can be obtained at the Bureau of Reclamation's Montana Area Office.

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Figure V-16

- **R** Cabin lease sites
- **R** Dams and powerplants
- **R** Offices and residential buildings at Canyon Ferry Village
- **R** Incidental buildings associated with area management
- **R** Areas where special use permits have been authorized

Private lands adjacent to the study area support primarily residential uses at the north end of the reservoir. O'Malleys, the restaurant and tavern above Yacht Basin Marina, and the Silos RV Park and Campground near Silos Campground, are commercial uses on adjacent lands. On both the east and west shores, some second home development is evident on adjacent lands, but ranching operations predominate. At the south end, ranching again gives way to more dense suburban development on adjacent lands.

Residential development along Canyon Ferry Road has dramatically increased since the late 1970s. Figure V-17 shows rural and residential areas. Development has been more limited on the east shore because of the demand for the location and the availability of water. Ultimately, as private land develops, some impacts may occur. The visual character of the reservoir will change to one that is more suburban in nature. Transportation conflicts may arise between residents wishing to get to work and slower-driving recreational traffic. There may be more unauthorized use of vehicles on Reclamation lands.

Cabin Sites.—There are 265 cabin site leases at Canyon Ferry: 167 along the northeast shore and 98 along the northwest shore. Recreation home site leases were first issued by the State in 1958. Reclamation's *1958 Management Plan* for the area states that, "Because of the scenic values of Canyon Ferry, with unusually good topography and tree cover, it is believed that this reservoir offers logical sites for public use and development, organized camping, club sites, and seasonal cabin sites." It further states that, "Although it is not known what the demands will be for private cabin sites, it is expected that a moderate number of requests will be received from individuals in the nearby communities." In his August 1987 thesis on the cabin site leases, Steven Clark (August 1987) concludes that, while no agency policy for initiating a lease program can be found, the following information may provide some reasoning. Cabins were being built on Reclamation land prior to the issuance of leases. This may have precipitated a lease program, since Reclamation was not opposed to cabin sites at the time but, rather, was concerned about the lack of a managing agency and orderly development. At the time the dam was built, there was resistance to a lease program from the local farming community whose lands were to be flooded. The early position of Reclamation was for leasing and for subsequent rapid development of the sites with structures that complied with codes and covenants.

The State of Montana managed the cabin lease lots as part of its agreement with Reclamation to manage all the recreation and lands at Canyon Ferry. This agreement was in effect from

February 1969 to January 1994, when management was turned back to Reclamation. Reclamation, with assistance from BLM, assumed management of the recreation area, including the 265 cabin sites. Under the cabin site leasing program administered by the State of Montana, lessees were granted the right to have a recreational cabin on Reclamation land for a 10-year renewable term and pay a lease amount based on fair market value.

In May 1995, the Office of the Inspector General (OIG) examined the cabin site leasing program and made several recommendations for improvement: (1) raise rents to fair market value, (2) develop a fair process to determine when a particular cabin site should be converted to public use, and (3) develop a process to allow cabin owners to amortize their investment in improvements on the sites in the event that sites be converted to public use. After the OIG report, Reclamation began phasing in a rent increase for the 1995-96 lease period, raising the average rental from about $430 per year to about $572 per year. The lease lot fees collected by Reclamation are turned over to the Treasury, and 15 percent can be used by Reclamation for administrative purposes.

An appraisal contract to determine fair market lease value was completed in the fall of 1995. The CFRA then went to the Congress and garnered support for legislation to sell the lease lots and take them out of public ownership. A bill was then passed that would allow these lots to be sold to private parties, with public access being maintained via the shoreline. See appendix B for a discussion of Title X of the Canyon Ferry Reservoir, Montana Act. As of January 2003, 216 of these lots have been purchased by the current lessees. The remaining lessees have until August 2014 to purchase their lots. Any lots unsold after that date are to be vacated, and the lands will remain in Federal ownership.

Sewage Disposal.—Aside from a community sewage treatment system at Canyon Ferry Village, all domestic sewage disposal at Canyon Ferry is handled by septic tanks and drain fields. Outhouses, with sealed tanks requiring pumping and disposal, are the method of sewage disposal used at the recreation sites, with the exception of the flush toilet at Hellgate. There is one public sewage dump station for recreational vehicles located at Kim's Marina. There is also a private dump station at Goose Bay, for which there is a charge.

The use of septic tanks and drain fields at the cabin sites has been a lingering concern of the Lewis and Clark County Health Department. Some of the smaller lots do not meet current State minimum lot-size standards and are often too small for replacement drain fields. Geology also limits this method of disposal. The cabin site lessees have expressed interest in finding offsite replacement areas for sites experiencing problems. One idea is to have a community off-site system to help solve the problem. Reclamation has allowed lands near the cabin sites to be reserved for potential septic systems, either individual or community.

Water Supply.—The water supply is provided by wells and hand pumps at recreation sites. There is a water pressure system for the bathroom at Hellgate and for irrigation at Silos. Canyon Ferry Village and Riverside receive their water supply from a well.

Canyon Ferry Reservoir
Residential Areas

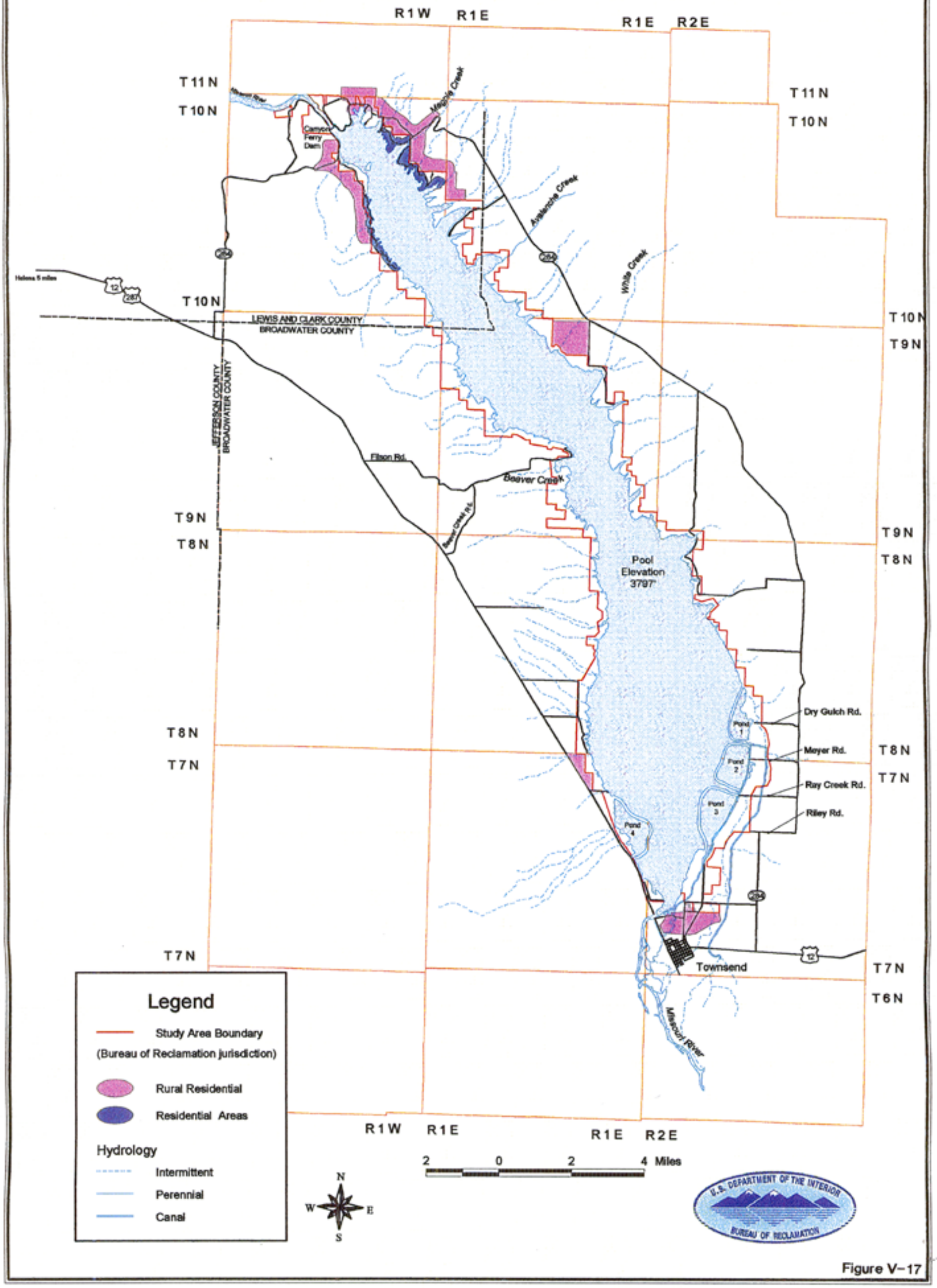

Figure V-17

Solid Waste.—There are two methods by which solid waste is removed at Canyon Ferry Reservoir: garbage transport and disposal. This has been confusing for many people. Garbage transport is provided to MFWP, Reclamation, and some of the cabin site lessees by a private vendor; city-county sanitation dumpsters are leased, and a monthly fee paid for weekly pick-up. Some cabin site lessees choose to haul their own garbage to county landfills.

Safety Considerations.—There are safety issues related to recreation, traffic, fire protection, and law enforcement at Canyon Ferry. Since other sections of this report will address the latter three topics, this section will cover recreation-related safety concerns.

Safety issues on Canyon Ferry Reservoir are related to motorboating, operating PWCs, sailing, fishing, sailboarding (windsurfing), swimming, and conflicts between these different recreationists. As the use of Canyon Ferry Reservoir increases, so will the opportunities for conflict.

Ice fisherman can create safety issues by not properly assessing ice conditions before driving onto the frozen reservoir. The vehicles are usually recovered but can be rendered inoperable, and they lose fluids in the water, causing environmental concerns.

Other hazards occur when motorboaters fail to yield right-of-way or ignore posted no wake or swimming areas. No wake areas are intended to protect marina visitors, sensitive environmental resource areas, and wildlife species. No wake zones are also intended to enhance visitor experience by separating visitor uses. Six areas on the reservoir are buoyed off as swimming areas. Boaters often infringe on these, creating a major safety problem. Boaters who encroach on posted swimming areas are fined as much as $500, as determined by the courts.

Winds and storms create a safety problem for boaters and swimmers. Swimmers can drift offshore in high winds. High winds and storms can capsize boats and cause groundings. Small boats and night anglers are in special danger in these conditions. In some instances, when boats or sailboards are caught in severe storms, search and rescue efforts can be life-threatening to rescuers.

High winds at the south end of the reservoir, near Silos, attract many sailboarders. Since few motorboaters use that end of the reservoir, sailboarders who get into difficulty with sudden storms have less chance of being rescued.

Conflicts between sailboarders and other recreationists also create safety concerns. Novice sailboarders can be capsized by motorboat wakes if boats come too near. There have been increasing numbers of close encounters between motorboats and sailboarders. Sailboards are particularly difficult to see when they capsize. Some novice sailboarders choose swimming areas to learn sailboarding. This can create a hazard for swimmers because it is sometimes difficult for novices to control their boards.

Many sailboarders do not wear lifejackets because they believe they restrict movement. The inland Navigation Rules contain a very general definition of "vessel," which has been construed to include sailboards. Sailboards are required to comply with applicable portions of the Navigation Rules (CGAUX, 2001.)

Enforcement has helped to keep water-related accidents to a minimum. U.S. Coast Guard records indicate that there have been four boating-related deaths from 1999-2000. The decrease in deaths coincides with increased CGAUX participation at the reservoir (Captain W.W. Peterson, Chief, Search and Rescue Branch, U.S. Coast Guard, letter dated January 29, 2001). The CGAUX may also conduct courtesy boat inspections for all safety equipment.

Only a few boat hazards in main traffic areas have been marked under the private-aids-to-navigation regulations and in cooperation with the CFRA.

Permits must be obtained from Reclamation for organized group recreational activities. Safety is considered before permits are granted.

Health Considerations.—The Lewis and Clark County Health Department is aware of individuals using water directly out of the reservoir and recommends against drawing water from the Missouri River system for culinary purposes. Ingesting Missouri River water is believed to increase health risks because of relatively high arsenic levels, the intermittent occurrence of toxic algae blooms, and other possible contaminants.

Boaters sometimes lack toilet facilities once they are on the water, resulting in raw sewage being dumped overboard.

Emergency Services.—Ambulance services are available from both St. Peter's Community Hospital in Helena and Broadwater Health Center in Townsend. Although there is no official policy in place, St. Peter's is usually called in case of an emergency because it has a broader spectrum of treatment facilities. Emergency Medical Technicians with local fire departments also respond to emergencies.

Schools.—In Lewis and Clark County, elementary students are served by School District No. 9, in east Helena. High school students are bused to Helena High School.

School buses travel as far as Jo Bonner to pick up students, stopping at Canyon Ferry Village, O'Malleys, and Jim Towne Road.

In Broadwater County, students attend Broadwater County High School and Townsend Elementary, both in Townsend. School buses travel on the east side of Canyon Ferry Reservoir (Highway 284), turning around at Goose Bay, and along the west side (Highway 287), turning around at the Broadwater County line.

Communications.—The CGAUX routinely patrols Canyon Ferry Reservoir from Memorial Day to Labor Day. The CGAUX is authorized to conduct any Coast Guard mission except military action. In 1999, the CGAUX installed a VHF marine radio base station at Yacht Basin Marina. This station provides radio coverage from Yacht Basin to the Silos Recreation Area. In 1998, MFWP provided the CGAUX with radios programmed to local law enforcement agencies for emergency use. In 2000, the CGAUX worked with the National Weather Service to install a station to monitor wind speed and direction. This allows pertinent weather information to be available for broadcast over the VHF radio system.

There are seven telephones available to the public for emergency use. One phone is located at the campground host facility at Hellgate and one each at Court Sheriff, Silos, White Earth, Chinamen's, Riverside, and Jo Bonner Campgrounds. There are also pay phones at the concessions. The phone companies are reluctant to provide pay phones in remote areas where use is low and the potential for vandalism is high. All fee campgrounds have a phone at the host site.

Electric Utilities.—Electricity is available at Court Sheriff, Hellgate, Silos, Chalet, Riverside, Chinamen's, White Earth, and Jo Bonner Campgrounds, and to cabin site residents on West and East Shore Drives.

Status of Reclamation Lands.—On July 23, 2000, the Buck Snort Fire started on private lands and spread to lands managed by Reclamation, BLM, and the Department of Natural Resources and Conservation. The fire burned about 15,000 acres along the west shore of the reservoir and the Spokane Hills before it was declared controlled on August 7, 2000. The fire demonstrated extreme fire behavior, which includes intense ground fire, with numerous flareups and torching and crowning of timber. Recreation sites, including day-use and camping areas, sustained damage, including six cabins on Reclamation-leased land. These cabins were completely destroyed. Damage to Reclamation recreation sites included picnic tables, toilets, and shelters. In August 2000, the following areas were temporarily closed:

Day-use areas	*Campgrounds*
Chalet	Confederate
Crittendon	Cottonwood
Lewis and Clark	Fish Hawk
Lorelei	Goose Bay
Orchard	Mahogany
Overlook	Cove

Out of 508 total acres affected, only 208 acres were severely burned and will require reseeding. The remaining acreage will recover on its own, with precipitation. The Buck Snort fire acreage breakdown is as follows:

Reclamation	508
BLM	3,472
State lands	755
Private	10,575
Total	15,310 acres

The Cave Gulch fire also started on July 23, 2000. The fire burned about 29,000 acres before being declared controlled on August 25, 2000. This fire started northeast of the reservoir and did not affect any Reclamation-managed lands. The fire moved northeast from Canyon Ferry into Helena National Forest.

While the Cave Gulch fire did not directly affect Reclamation-managed lands, Hellgate Campground was used as the Incident Command Post. An Incident Command Post is the staging area where the fire crews sleep, eat, and acquire new equipment and supplies. After a few weeks of closure, Hellgate Campground was reopened to the public before the Labor Day weekend. Some parts of the campground will be reseeded as part of the fire rehabilitation effort. See chapter VI, "Land Use Specific Management Actions," for fire rehabilitation goals and treatment projects.

Flood Easements.—Reclamation has designated a flood easement up to elevation 3808.5 feet in the vicinity of East and West Shore Drives as part of the cabin lease lot sale process. At the time that lands were acquired for construction of the reservoir, flood easements were acquired on private lands where the potential for flooding was anticipated. Reclamation is not liable for property damage caused by flooding on lands where there are flood easements. These lands are located at the south end of the reservoir, near Townsend.

Federal Flood Plain Designations.—The Federal Emergency Management Agency has mapped flood hazard boundaries for two tributaries to the reservoir: Missouri River and Duck Creek (see figure V-9). Flood hazard boundaries are approximate limits of a 100-year flood event, based on historical flood events and ground elevations, rather than a detailed study. Other tributaries to Canyon Ferry may flood but have not been mapped.

Encroachments.—Private encroachments on Reclamation lands at Canyon Ferry include the following:

Retaining Walls.—Because the visual and structural quality of retaining walls around the reservoir varies, the CFRA has recently initiated efforts to develop standards for construction of retaining walls and is interested in working with Reclamation and the Lewis and Clark County Conservation District Board. Most retaining walls have been privately constructed and are in various stages of disrepair. In addition, Reclamation has constructed walls or placed riprap to protect against shoreline erosion, where public access or health and safety are of concern.

Boat Docks and Other Land-Based Facilities.—Title X of P.L. 105-277, the Canyon Ferry Reservoir, Montana Act, requires that the Secretary sell the 265 recreational cabin sites at Canyon Ferry Reservoir, Montana, to private parties. Also, the act allows each cabin site owner to have a boat dock in the reservoir. Because the act does not give the land between the cabin site and the reservoir to the cabin site owner, the land remains part of Federal property.

Private Landscaping and Irrigation Systems.—In some cases, elaborate landscaping projects and irrigation systems have been installed at considerable private expense on public shorelines and outside cabin site lease boundaries. These areas are open to public use and sometimes generate misunderstandings between the lessee and the public when the public attempts to use the shoreline areas.

Cattle.—At times, cattle graze on Reclamation lands without the benefit of a grazing lease. This occurs, for the most part, on the west shore between the cabin sites and Silos Campground, where the fences are in need of repair. The fences on the east side, from Confederate Bay to Goose Bay, are in need of repair to prevent cattle grazing.

Canyon Ferry Village.—Canyon Ferry Village consists of an office building, warehouses and garages, parking for the office, and a Visitor Center with parking, tennis courts, a boat dock, 15 houses, and 15 storage sheds. All the structures in the village, except the Visitor Center, were built in the 1940s and 1950s for construction of the dam and powerplant. The Visitor Center was a school house located in the Missouri River Valley before the current dam was constructed.

The Visitor Center is used as a natural history and heritage interpretive and information center for visitors. It is also used as a community center, for holding elections, and as a class and dining room by the Montana Science Institute. In 1998 and 1999, it was reviewed for life safety code compliance, and with some relatively minor changes, was approved for occupancy.

In 1996, Reclamation sold the houses, sheds, and the boat dock facility to the Montana Office of Public Instruction (OPI). This office, in turn, lets the Montana Science Institute use the facilities for its science camps. Reclamation retained ownership of the land where the houses are located, but leased the land to OPI for 20 years, starting in 1996.

Montana Science Institute.—The Montana Science Institute will continue to study water quality at Canyon Ferry. The Montana Science Institute is a nonprofit corporation, covering expenses through grants and tuition. Although the Montana Science Institute is currently administered as a summer program, its directors are ultimately working toward the creation of a year-round water study institute, replete with an all-encompassing data base on water throughout the United States, an ongoing data base for the Missouri River drainage, acquisition of sophisticated water analysis equipment, field staff, and creation of a unique learning resource available to the Nation.

The Montana Science Institute has applied for grants from various foundations. Grant awards would enable the establishment of an annual water congress at Canyon Ferry, the development of a multiple-grade-level curriculum centered around water quality and aquatic ecology, and purchase of computers and other analytical equipment essential to such a learning center.

Canyon Ferry Airport.—Montana Aeronautics Division of the Montana Department of Transportation has a use permit to conduct public airport activities at Canyon Ferry Airport, located just north of Silos Recreation Area. In the fall of 1986, Reclamation became concerned over the construction of two new hangars on the airport property, and discussions were held between MFWP, Reclamation, and the division. All parties agreed to delay any further construction until Reclamation had time to study the long-term plans for the property.

Reclamation will work with the Montana Aeronautics Division and other interested parties on the disposition of the Silos area airport lands. The Montana Aeronautics Division has indicated they are not interested in owning more airport property or facilities in Montana. The Broadwater County Commissioners and the Montana National Guard have indicated an interest in operating the airport. The Montana Aeronautics Division, the Montana National Guard, and the Broadwater County Commissioners, as well as adjacent land developers, would like to have the airport remain open.

For a transfer of land ownership to take place, Reclamation would have to make a formal determination that the land in question is no longer needed for project purposes and report the lands as excess to GSA. Reclamation is in the process of making a formal determination on the lands and preparing the Report of Excess Lands to submit to GSA. GSA then must conduct a screening process, with the lands first being offered to other Federal agencies. If there is no interest identified in this screening process, the lands are then made available to other public entities (i.e., the State and counties). An environmental review would have to be prepared to assess the impacts on nearby recreation facilities and residential subdivisions. This issue is yet to be resolved.

The use of Canyon Ferry Reservoir water surface by owners of recreational sea planes would require a special use authorization permit issued by Reclamation. The duration of such a permit and other conditions and stipulations would be included in the use authorization document. This type of permit would be administered by Reclamation and not a concessionaire.

Wildlife Management Area.—The agricultural leases are all located within the WMA and are written for 5 years and were renewed in 1999. There are seven leases, with a total of 758 farmed acres. All leases, except one, consist of a hay/grain rotation with no grazing and incorporate blocks of nesting and winter cover. Winter cover consists of shelter belts for upland birds. One lease is a preferential lease dating back to the time of construction of the dam. When the lands required for the reservoir were acquired, some lands not inundated by the reservoir were leased back to the original owner. This owner grazes livestock on that lease during the nongrowing season and moves the livestock to private lands during the growing season.

MFWP has also made improvements at the WMA. These improvements are listed below. The parking lot item for pond 4 includes a boat ramp and a handicapped-accessible viewing deck.

Interpretive signs will also be installed.

The "Wildlife Management Area" information was taken from a letter from Tom Carlsen, MFWP, dated September 14, 2000.

Project	Area	Year completed	Cost ($)
Parking lot	Riley Road	2000	6,000
Parking lot[1]	Pond 4	1999	35,000
Parking lot	Riley Road	1998	2,250
Parking lot	Ray Creek	1998	13,115
Road maintenance	WMA system roads	2000	6,000
Septic system	MFWP office	2000	10,000
Pivot irrigation	Parcel 45A	1997	23,500

[1] The parking lot for pond 4 includes a boat ramp and a handicapped-accessible viewing platform. Interpretive signs will also be installed.

Irrigation.—There are currently two long-term (40-year) contracts for irrigation water from Canyon Ferry Reservoir. These contracts will expire after the RMP/EA term of 2010. Reclamation sells water to irrigators near Beaver Creek and on the north end of pond 4 in the WMA. Additional water may be available for irrigation. Water is also being supplied via a tunnel and canal to the district to irrigate about 15,000 acres.

Fencing.—Since Montana is an open range State, or a fence-out State, Reclamation is responsible to fence the land it controls. The entire land around Canyon Ferry Reservoir is considered open range for cattle; therefore, it is a fence-out area, and Reclamation must fence

cattle out of its land. But, the land on the east side of the reservoir in Broadwater County is within a horse herd district and is a fence-in area (for horses). The Montana livestock laws, under TITLE 70 PROPERTY; 70-16-205 Monuments and fences – mutual obligation of adjoining landowners, describes how adjacent landowners are required to install and maintain common fences.

The reservoir is fenced down to Townsend on the east side of the reservoir. On the west shore, fencing is complete from Townsend north to Canyon Ferry Airport. From the airport north, Reclamation lands are unfenced until Orchards day-use site, where fencing resumes again and continues north to the dam.

At present, lack of a boundary fence has allowed cattle to trespass onto Reclamation lands. There have been complaints about cattle grazing between White Earth and Silos because cattle diminish the recreation experience of the visitors.

Other Land Use Issues.—

Timber Sales.—No sales are planned by the Helena National Forest over the next 10 years; however, salvage operations near Magpie and Sulfur Bays may occur within the next 5 years as a result of the fires in 2000.

The Forest Plan recognizes the need for view and watershed protection relative to Canyon Ferry. Watershed protection includes the mandatory use of Best Management Practices and keying mitigations to maintain fishery quality in trout streams such as Deep Creek.

Signing.—Directional signing for tourists consists of highway signs at the turnoff onto Canyon Ferry Road from Highway 287, from Highway 12 onto Highway 284 near Townsend, and along Canyon Ferry Road between Canyon Ferry Dam and Helena. Signs are also located near turnoffs to recreation sites along the roadways. Private commercial signs also signal tourists along Interstate 90, Highway 287, and on Canyon Ferry Road.

Regulatory signing appears at individual recreation sites.

Commercial signs associated with private vendors and concessions are located both on and off Reclamation lands.

Access.—Access to Hole in the Wall fishing area needs to remain open to provide access to this popular fishing place. Reclamation will work with adjacent landowners in an attempt to secure legal access. However, if public access as it is today cannot be established, Reclamation will establish new access across Reclamation lands to the south of the existing access road.

Landscaping.—Landscaping for purposes of replacing wildlife habitat that was inundated by the dam was first attempted in the late 1950s at the river inlet to the reservoir. Since then, many sites have been landscaped for esthetics, dust control, and privacy. One of the most limiting factors to the successful establishment of vegetation has been a lack of consistent O&M of existing irrigation systems and personnel to maintain plantings. Water could be taken from the reservoir for such irrigation purposes, but, to date, this has not been done.

Future Land Use.—Private residential development will continue adjacent to the reservoir.

Future commercial development at the reservoir will be examined in light of the policies developed by this plan and a CSP, as described in chapter II. One suggestion has been the opening of a commercial marina at Silos and the possible development of a destination resort. There is no zoning in either Lewis and Clark or Broadwater Counties that would preclude such development on private land.

The opening of additional recreation sites has been suggested, as has the re-opening of day-use camping sites on the west shore. Until 1979, the west-shore sites were open to camping, but camping was discontinued because of poor road conditions, associated night travel, and the difficulty of managing yet another area on a 24-hour basis. Sites were considered too small, too steep, and too close to the cabin sites and, thus, were determined to be more appropriate for day use.

Landownership Patterns.—The landownership pattern immediately adjacent to Canyon Ferry Reservoir was determined when the reservoir was first constructed and filled. Private properties were bought in aliquot parts from affected landowners.

The entire shoreline is open for public use. These lands are administered by Reclamation for authorized project purposes. The amount of shoreline adjacent to cabin sites and available for public use varies, depending on topography and the size of the lot leased to the cabin site owners.

At the north end of the reservoir, adjacent to Reclamation lands, the ownership pattern is of relatively smaller, privately owned parcels (20 acres or less). Within Lewis and Clark County, most parcels within 1-1/2 miles of the reservoir fit this 20-acre pattern, although there are a couple of exceptions, including a large BLM parcel at Crittendon Gulch.

Along the midsections of the reservoir in Broadwater County, most adjacent land within 1-1/2 miles of the boundary of Reclamation lands is in large private ranch holdings, with the exception of some smaller parcels of land, and State School Trust lands, BLM parcels, and several 20-acre divisions of land.

At the southeast end of the reservoir, near Townsend, private ownership of parcels of 100 acres or less predominates.

Environmental Consequences

Alternative A.—Land use permits would be issued on a case-by-case basis, without regard to a comprehensive land use planning strategy. Under this alternative, the same types of recreation activities would continue; therefore, negative impacts to existing land resources and user groups would probably continue. Exclusive use of some Canyon Ferry Reservoir lands would probably continue, to the exclusion of the general public. Cattle trespass and unauthorized access to the reservoir would continue to cause damage to environmental resources and provide conflicts with adjacent landowners. Implementing the fire rehabilitation actions established by Reclamation, pursuant to the fire rehabilitation goals formulated by Reclamation and BLM, will return the impacted area to its pre-2000 condition.

Alternative B.—Land use permits would be issued only if they do not conflict with adjacent land uses or other land use authorizations within the study area. Land use limitations and potential impacts to the environmental resources would be taken into consideration when determining the types of uses that will be permitted. Geographic Information System mapping will help to eliminate potential impacts to existing resources by identifying environmentally sensitive areas. Implementing a comprehensive land use planning strategy (e.g., signing, fencing, vegetative screening, and controlling vehicular access) will decrease the number of conflicts within the reservoir area. Implementing the fire rehabilitation actions established by Reclamation, pursuant to the fire rehabilitation goals formulated by Reclamation and BLM, will return the impacted area to its pre-2000 condition.

Alternative C.—Same as Alternative B.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

Under the action alternatives, all land use permits would contain specific stipulations to protect existing resources, decrease potential conflicts with adjacent landowners, and prevent land use conflicts within the study area.

TRANSPORTATION

Affected Environment

Access.—The major highways serving the region are Interstates 15 and 90. These interstates connect Helena and Great Falls and intersect Highway 12-287.

Highway 287, between Helena and Townsend, serves the east side of Canyon Ferry. Highway 287 is paved all the way. The northwest end and the east side of the lake are served by Highway 284 between its junction with 287, near East Helena, and its junction with Highway 12 on the southeast end of the lake. All of Highway 284 is paved, except for a 3-mile section between Magpie Gulch and the Lewis and Clark County border just north of Hellgate Gulch. The State assumed maintenance responsibilities of Highway 284 from Broadwater and Lewis and Clark Counties. Lewis and Clark County will do the road grading on the 3-mile section that is not paved.

At the Canyon Ferry Road intersection, Highway 284 continues northeasterly across Canyon Ferry Dam, passing around the northern end of the reservoir and down the east shore, where it rejoins Highway 12-287. Recreation sites on the east shore are accessed by feeder roads off Highway 284.

From the west and north, Canyon Ferry Reservoir is accessed locally by Canyon Ferry Road. This is a major arterial that begins 4 miles east of Helena.

Two minor arterials that access cabin sites and recreation areas are East and West Shore Drives. East Shore Drive begins at Canyon Ferry Road at Jo Bonner Recreation Area. It forks, winding along the shoreline about 2.5 miles to the southeast and about 1.5 miles to the northwest. East Shore Drive accesses most of the reservoirs's cabin sites and Cave Bay and Jo Bonner Recreation Areas. West Shore Drive begins at Canyon Ferry Road at Yacht Basin, curving along the rather precipitous west side, accessing cabin sites and seven public day-use areas. Jim Towne Road connects the Canyon Ferry area with the York Lake and Hauser Lake areas, going from Riverside Campground north to York Road.

Road Condition and Maintenance.—Canyon Ferry Road is paved from its junction with Highway 284 to Magpie Gulch. All of Spokane Creek Road/Highway 287 is paved. With minor exceptions, all the remaining access and interior roads, about 38.5 miles of road, are gravel surfaced. Highway 287 between Helena and Townsend serves the east side of Canyon Ferry Reservoir. The northwest end and the east side of the reservoir is served by Highway 284 between its junction with 287, near East Helena, and its junction with Highway 12 on the south end of the reservoir.

The State of Montana has assumed management of Highway 284 and Canyon Ferry Road. A large portion of Highway 284 was resurfaced in 2000. All of Highway 284 is paved except for a 3-mile section between Magpie Gulch and the Lewis and Clark County line just north of Hellgate Gulch.

The State of Montana maintains Highway 284 to the Lewis and Clark County line, about three-quarters of a mile of Hellgate Road from the turnoff at Highway 284 to the cattleguard at the entrance to the recreation area, as well as all roads accessing the reservoir on the east side up to Reclamation land boundaries. The only exception to this is that Lewis and Clark County performs the maintenance on the 3-mile section that is not paved, as mentioned above. On the west shore, the county maintains the access roads from White Earth and Silos Recreation Areas to the Reclamation land boundaries.

The State of Montana maintains Highway 287, a Federal aid primary road. All the remaining roads accessing the reservoir are maintained by Reclamation.

Reclamation maintains about 4.5 miles of West Shore Drive from Yacht Basin Marina to its terminus and about 4 miles of East Shore Drive. The maintenance schedule calls for watering and blading both drives once in the spring and once in the fall. Roads maintained as interior access to recreation sites total about 30 miles. Until 1994, maintenance also included the application of magnesium chloride to control dust on all unpaved roads. Magnesium chloride was applied to selected roads during the fires of 2000.

The U.S. Forest Service maintains roads leading up many of the gulches to its lands on the northeast side of the reservoir.

Traffic Volumes.—Traffic is generated primarily by two groups: residents (seasonal and permanent) and recreationists (in the summer).

Safety Issues.—Many of the roads in the study area are narrow and winding. Narrow, winding roads, together with graveled surfaces, mean road hazards are inevitable. Road hazards have been a lingering concern of area managers. Some area roads are built above steep embankments that have no guardrails (e.g., East Shore Drive). Such construction creates a safety hazard.

There are no paths or trails set aside exclusively for pedestrians or bicyclists, except for the handicapped-accessible trails to restrooms. Walking and bike riding have been cited as potential hazards on the area's narrow, winding roads, specifically along West Shore Drive and along Canyon Ferry Road between Yacht Basin and the dam.

Proposed Improvements.—Lewis and Clark County has listed the reconstruction of about 9.5 miles of Canyon Ferry Road east of Helena as a priority for funding. The estimated cost of this project is $2.5 million, and the date of completion is estimated some time after 2001. The road was cold patched and chip sealed during the summer of 2000.

The county also has an improvement priority list for low-cost mitigations of existing traffic hazard areas. Two of the top priority improvements have been for signing and painting portions of Canyon Ferry Road: on curves and at the intersection of Canyon Ferry Road and Valley Drive.

The paving of about 2.5 miles of Highway 284, from Avalanche Creek to the Lewis and Clark County line, was completed in 1992.

Unauthorized ORV Use.—A proliferation of roads and trails resulting from the use of ORVs has damaged vegetation and soils in the study area. ORV use can also contribute to the introduction and spread of weeds. Vehicle use is allowed only on roadways. No ORV use areas have been officially designated at Canyon Ferry Reservoir. Resource damage can be seen on steep hillsides above the campgrounds on the north shore.

Reclamation staff have been only partially successful in deterring ORV use by fencing off access because, during reservoir drawdown, low water exposes land below the fence line, which then becomes accessible to vehicles. Where terrain prevents accessibility by some larger vehicles, it remains open to ATVs. Where roads are built inside the boundary fence, they provide access to the remainder of the shoreline.

Handicapped Access.—Handicapped-accessible facilities are a recent addition. In 1991, accessible parking pads, trails to restrooms, and accessible restrooms were added to Silos, Shannon, and Riverside Recreation Areas. In addition, Riverside Recreation Area maintains a handicapped-accessible boat dock. Accessibility improvements to the Canyon Ferry Visitor Center were completed in 1995. Starting in 2003, handicapped-accessible surveys and action plans will be prepared.

Other Concerns.—Reclamation has an easement on Eagle Bay Drive for access to maintain Canyon Ferry Dam and Helena Valley Pumping Plant. The area below the west side of the dam has been managed for fishing access.

Environmental Consequences

Alternative A.—Under this alternative, public safety would continue to be compromised because road O&M procedures would not be established, proper signing would not be installed, and

funding levels for road improvements would not change. The number and type of access roads to the reservoir would remain the same as it is today. Except for a gradual increase in visitation, traffic volumes on roads within and outside the study area would remain essentially the same.

Alternative B.—Under this alternative, roads would be improved, year-round access would be provided, signing would be installed, and an O&M program for maintaining all roads would be evaluated to achieve standards of safety and resource protection. Public safety would increase. The closure of roads that provide illegal access to the reservoir, and the expected increase in visitation attributed to this alternative, will increase the volume of traffic on the remaining roads. However, measures to enhance public safety will more than offset any potential negative impacts to the safety of visitors that may be caused by increased vehicular traffic.

Alternative C.—The scale of development contemplated under this alternative will increase visitation and the volume of traffic on interior and exterior roads above what would be anticipated under Alternative B. Paving of some interior roads would help to protect public safety; however, increased vehicular traffic resulting from increased visitation may create some safety concerns for the general public.

Cumulative Impacts

Both Alternatives B and C would increase visitor use at the same time the human population of the surrounding area is increasing because of residential development. Increases in visitation at Canyon Ferry Reservoir, combined with an increase in permanent residences in the area, would increase traffic and congestion on the surrounding roads. Traffic problems would probably occur only during the recreation season (June to September), with the heaviest concentrations occurring on weekends and holidays.

Mitigation

No mitigation has been identified.

NOISE

Affected Environment

Noise conflicts at Canyon Ferry Reservoir center primarily around the use of a variety of motor vehicles in proximity to recreation sites or cabins. No noise measurements have been taken in conjunction with the management of Canyon Ferry, so current sound levels have not been established.

The primary area of conflict is the north end of the reservoir, where about 80 percent of the recreational use occurs and where the cabin sites are located. Sounds are also magnified in certain areas by echoes off nearby canyon walls (see figure V-9).

The use of jet skis in confined bays, such as Magpie, Court Sheriff, and Hellgate, has raised complaints from both cabin site lessees and recreationists. The machines are commonly driven in a circular pattern within the bay, generating a continuous source of noise. This conflict has not been resolved despite communication between the two groups.

In 1991, the State legislature passed HB 833, establishing noise standards for all vessels, including jet skis at 90 decibels at 1 meter from the point of exhaust.

At the six open houses held in June 1999, the use of jet boats at Canyon Ferry was documented as an issue. Once again, the boats are able to meet noise requirements if properly operated. However, they can be operated in such a fashion (violating equipment standards) that noise limits are grossly exceeded, which has often been the case in the past. Six comments from the six open houses concentrate on the need to regulate jet skis; in particular, the need to use stock water boxes (exhaust). Other comments, some of which indirectly related to jet skis, included the need to enforce no wake zones for boat ramps, swim beaches, and campgrounds (4 comments) and provide an appropriate level of law enforcement to enforce speed limits and boating regulations (15 comments).

In general, noise "infractions" at Canyon Ferry Reservoir have been remedied by the presence of enforcement personnel and through policy adoption. A prohibition of particular vehicles or sources of noise is not likely; enforcement and control will focus on existing noise standards and nuisance laws instead.

Environmental Consequences

Alternative A.—Under this alternative, no restrictions would be imposed on the types of activities that would be allowed or on where certain recreation activities could take place. Noise conflicts between ORV users and other recreationists would continue. Noise conflicts between watercraft users, both PWC and motorboat users, and other users would continue in the cove areas of the reservoir and, especially, in the northern portion of the reservoir near the lease lot areas.

Alternative B.—Visitation is expected to increase because of the planned increase in the number of recreation facilities and opportunities. Therefore, noise levels in developed areas would probably increase. Signing, improved roads, elimination of ORV and ATV use, increased law enforcement, and the establishment of no wake zones in coves and at swim beaches, boat

ramps, and campground and day-use areas may offset any increased noise levels that might be attributed to an increase in facilities and opportunities. Planting vegetation to create visual buffer zones will also help muffle noise.

Alternative C.—Same as Alternative B, except for a slight increase in noise levels at developed recreation areas because of an anticipated increase in visitation.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

Proper signs will be posted throughout the reservoir area, informing the public of the rules and regulations governing the use of Canyon Ferry Reservoir land and water areas. The penalties for violation of established rules and regulations will also be posted. Reclamation will work with law enforcement entities to encourage adequate enforcement of the laws and regulations.

SOCIOECONOMICS

Affected Environment

As stated earlier, Canyon Ferry Reservoir is situated on the Missouri River in west-central Montana. Part of the reservoir is located in the far southeastern portion of Lewis and Clark County, and the remainder of the reservoir lies within the northern part of Broadwater County. The city of Helena, State capitol of Montana, is approximately 15 miles west of the reservoir, and the town of Townsend is located at the southernmost end of the reservoir. Table V-8 shows the 1990 population and the projected population of the counties and the region. The region's 1990 population of 50,813 is projected to increase approximately 63 percent, to 82,910, in 2020.

Table V-9 lists total income and earnings for the two counties in the study area for 1980, 1990, and 1996. For both counties, total income changed significantly during the 1980 to 1990 period. There was a total increase of approximately 80 percent and an average annual increase of about 7.9 percent in Lewis and Clark County. For Broadwater County, there was an increase of approximately 89 percent, which is about an 8.9-percent average annual increase. The average annual increase of 8.0 percent in total income for the two counties is more than the national estimate (7.5 percent) and the Rocky Mountain region (6.8 percent) for the 1980 to 1990 period.

Table V-8.—1990 population and 2000/2020 projections[1]

		Projected population	
	1990 census	2000	2020
Broadwater County	3,318	4,230	5,550
Lewis and Clark County	47,495	55,110	77,360
Region	50,813	59,340	82,910

[1] http://commerce.state.mt.us/ceic/demog/project/npa99mt.htm

Table V-9.—Income[1]
($ million)

	Lewis and Clark County			Broadwater County			Two-county region
	1980	1990	1996	1980	1990	1996	1996
Total personal income	$431.5	$773.4	$1,123.3	$23.4	$44.32	$64.9	$1,056.7
Earnings by industrial sector							
Farm	2.3	1.9	0.1	0.8	3.6	3.3	7.60
Agricultural services, forestry, fishing, and other	0.6	1.3	2.3	0.1	NA[2]	0.3	3.20
Mining	3.2	3.5	4.8	0.3	NA	2.9	8.90
Construction	17.3	21.3	54.7	1.3	1.3	2.2	41.00
Manufacturing	26.9	25.1	35.7	2.6	2.8	6.6	39.40
Transportation, utilities, and communications	46.1	38.3	43.2	0.3	2.7	3.4	48.10
Wholesale trade	14.3	17.4	26.8	1.0	0.9	1.6	26.20
Retail trade	33.9	64.2	84.9	2.0	2.0	2.6	86.70
Financial, insurance, and real estate	21.0	35.4	63.9	0.5	0.5	1.1	55.00
Services	64.4	148.9	254.0	0.9	3.4	4.7	215.10
Government							
Federal	25.2	49.1	63.9	0.7	0.9	1.4	66.47
State and local	84.7	149.1	211.5	2.2	2.8	3.9	192.30
Total earnings by place of work (labor income)	341.8	557.9	848.4	12.7	22.4	34.2	790.00

[1] U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information Systems, 1969-96, 1997, Washington, DC 20230.
[2] Not available.

For the 1990 to 1996 period, total income increased by more than 45 percent each in Lewis and Clark and Broadwater Counties. The average annual increase for each county during this period was less than the 7.5-percent national average and less than the Rocky Mountain region's 6.8-percent increase.

Earnings by industrial sector are displayed for the two counties in table V-9. For 1996, services (30 percent) and State and local government (25 percent) had the largest share of total earnings for Lewis and Clark County. For the government sector, the percentage is high because the State capitol is in this county.

For Broadwater County, manufacturing (19 percent) and services (14 percent) had the largest percentage share of earnings, followed by State and local government (11 percent) and transportation, utilities, and communications (10 percent).

Employment is listed in table V-10 for the two counties within the study area. The largest employers in Lewis and Clark County for 1996 are in the service sector (34 percent of total employment) and the State and local government sector (19 percent), followed by retail trade (17 percent). In Broadwater County, the largest employers are in services (21 percent), retail trade (16 percent), and manufacturing (13 percent).

The trend in employment during the past 16 years for Lewis and Clark and Broadwater Counties has been a decline in agriculture and a rise in services, which follows national and regional trends.

Most of the expenditures (approximately 65 percent) by nonarea visitors at Canyon Ferry Reservoir are made in the retail trade sector (eating and drinking, gas and other transportation, and food stores) and the service sector (hotel and lodging).[11] The remaining expenditures were for licenses, fees, etc.

As discussed in the "Recreation" section, the public identified social issues and concerns about the present conditions at Canyon Ferry Reservoir and identified actions and activities they would like changed in the future.

Environmental Consequences

To identify the effects that changes in recreational use at Canyon Ferry Reservoir may have on the regional economy (Broadwater and Lewis and Clark Counties), a regional impact analysis

[11] The percentage of expenditure data was derived from expenditures of non-Montana residents who visited Canyon Ferry Reservoir and responded to the 1995 Canyon Ferry Recreation Survey, Institute of Tourism and Recreation Research, University of Montana, page 38, August 1996.

Table V-10.—Employment by industrial sector[1]
(Number of jobs)

	Lewis and Clark County			Broadwater County		
	1980	1990	1996	1980	1990	1996
Employment by industrial sector						
Farm	547	592	516	333	323	289
Agricultural services, forestry,	117	191	398	16	NA[2]	60
fishing, and other	107	184	152	12	NA	66
Mining	1,031	1,005	1,925	93	72	147
Construction	1,286	1,075	1,325	153	148	257
Manufacturing	1,974	1,267	1,318	29	109	98
Transportation, utilities, and	746	768	927	64	44	42
communications	4,019	5,155	6,422	246	217	320
Wholesale trade	2,184	2,310	2,667	65	82	97
Retail trade						
Financial, insurance, and real	6,575	9,352	12,634	184	267	439
estate	1,544	1,791		70	69	66
Services	5,781	6,409	1,637	208	164	161
Government			7,174			
Federal						
State and local						
Total employment (Number of jobs)	25,911	30,099	37,095	1,473	1,495	2,042

[1] U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information Systems, 1969-96, 1997, Washington, DC 20230.
[2] Not available.

was done. A regional impact analysis makes use of an Input-Output model (IMPLAN 1999[12]) to describe the interdependency of individual industrial sectors as consumers and producers and, thus, depict the structure of the regional economy. The model examines the interactions between 528 separate industries. In this regional impact analysis, the changes in recreation use of Canyon Ferry Reservoir, caused by implementing the action alternatives, are examined to determine the effects on total output, employment, and labor income.

For this analysis, it is important to identify changes in recreation-related expenditures that are attributable to individuals living outside the two-county region. These changes measure the flow of dollars into the region or out of the region caused by the action alternatives. Local residents' expenditures are not counted because it is assumed that if local expenditures for recreation are not made at Canyon Ferry, then they would be made somewhere else within the local economy for other goods and services. It follows that changes in local expenditures would not cause a change in impacts on the regional economy.

[12] Minnesota IMPLAN Group, Inc., *1999 IMPLAN Professional Version 2.0 Social Accounting and Impact Analysis Software*, April 1999. Stillwater, Minnesota.

The following economic analysis shows the impacts to the regional economy from a range of potential visitation increases from outside Lewis and Clark and Broadwater Counties. The analysis was developed using assumptions of a 5-percent, 10-percent, and 20-percent increase in visitation, which could result from implementing one of the action alternatives. Since the actual increases in visitation cannot be accurately estimated, these percentages represent a probable range of visitation increases. The economic benefits resulting from development of one of the alternatives will likely fall within this 5- to 20-percent range. The format of this section is different than the other environmental consequences sections so that the impacts can be described for the potential percentage increases in visitation.

These economic impacts are of concern to various people and firms in the region because they are measures of the general economic well-being of the region. The information provided by a regional analysis can be used in decisionmaking by individuals, firms, and various levels of government.

In July 1998, a study was completed on the potential contribution to the regional economy (Lewis and Clark and Broadwater Counties) of recreation activities at Canyon Ferry Reservoir (Borda 1998).[13] This study estimated the annual recreation visitors from outside the study area to be 73.65 percent of total visitor use. Total visitor use, including winter use, has been estimated at 259,000 recreation visits. Thus, the number of visits by people from outside the study area would be 190,750. This figure was multiplied by expenditure data, indexed to 1996, for various sectors of the economy related to recreation. The total recreation-related expenditures for 1996 were $13,177,200 (table V-11). (The year 1996 was chosen as the base year because this was the data year for the available IMPLAN model that was used to establish the baseline recreation impacts.) The minor economic changes would not affect regional population.

Alternative A.—In this analysis, the present condition is used to represent the No Action Alternative. All action alternatives were compared to the No Action Alternative to determine changes in conditions.

Total recreation-related expenditures were input into the IMPLAN model to estimate the total impact of recreation on the local economy.[14] The baseline for this two-county economic impact

[13] Borda, Charles, *Recreation Economic Analysis, Canyon Ferry Reservoir*, July 1998, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado.

[14] Total impacts are made up of direct, indirect, and induced impacts. Direct impacts are the result of the initial changes in primary inputs that occur. In this case, those changes in visitor expenditures that occur within the sectors of the economy (sporting and athletic goods, transportation services, other retail purchases, groceries and beverages, purchases of food and drink, lodging, gas/oil and repairs, and guide services/other recreation) that relate to recreation at Canyon Ferry Reservoir. Indirect impacts are the increased economic activity of firms that provide goods and services to those businesses directly serving visitors. Induced impacts are the result of changes in house-hold expenditures due to changes in household income resulting from direct and indirect effects.

analysis was $18.4 million (1996 dollars) in total industrial output, 390 full- and part-time jobs, and $6.6 million in labor income, all based on recreation-related expenditures of $13,177,200 by visitors from "outside the local area" (tables V-11 and V-15).

Table V-11.—Alternative A, present condition
Recreation expenditure data for impact analysis for 1996[1]

IMPLAN sector number	IMPLAN sector description	Average 1988 expenditures ($) Per-person trip	Average 1988 expenditures ($) Indexed to 1996	Total expenditures ($) Based on 190,753 visits
421	Sporting and athletic goods	5.40	7.16	1,365,800
440	Transportation services	6.05	8.02	1,529,800
449	Other retail purchases	3.90	5.17	986,200
450	Groceries and beverages	7.70	10.21	1,947,600
454	Purchases of food and drink	5.70	7.56	1,442,100
463	Lodging	7.10	9.41	1,795,000
479	Gas/oil and repairs	14.60	19.36	3,693,900
488	Guide services/other recreation	1.65	2.19	417,700
	Total	52.10	69.08	[2]13,177,200

[1] Borda, Charles, July 1998, *Recreation Economic Analysis, Canyon Ferry Reservoir*, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado.
[2] Rounded figure.

The increase in the number of recreation facilities and the improvements to recreation facilities desired by the public would not happen. User conflicts would continue, and the level of satisfaction of users would likely decline. Levels of use might decline by some user groups (e.g., families, senior citizens), and use by other groups (e.g., ORV and PWC users) could increase.

Alternative B (5-Percent Increase in Recreation Use).—For Alternative B, the recreation-related expenditures from table V-12 were input into the IMPLAN model to estimate the impact of an increase in recreation use on the local economy. The results for a 5-percent increase in visitor use, due to implementing Alternative B, were $19.3 million (1996 dollars) in total industrial

Together, the magnitude of the combination of all impacts circulating and recirculating within the regional economy is referred to as the "multiplier effect." The "multiplier" is the ratio of direct impacts to total impacts. The multiplier in this case is 1.4.

output, 410 full- and part-time jobs, and $6.9 million in labor income. The results were based on recreation-related expenditures of $13,835,900 by visitors from "outside the local area" (tables V-12 and V-15).

Table V-12.—Alternative B, 5-percent increase in visitor use
Recreation expenditure data for impact analysis for 1996[1]

IMPLAN sector number	IMPLAN sector description	Average 1988 expenditures ($) Per-person trip	Average 1988 expenditures ($) Indexed to 1996	Total expenditures ($) Based on 200,288 visits
421	Sporting and athletic goods	5.40	7.16	1,434,100
440	Transportation services	6.05	8.02	1,606,300
449	Other retail purchases	3.90	5.17	1,043,500
450	Groceries and beverages	7.70	10.21	2,044,900
454	Purchases of food and drink	5.70	7.56	1,514,200
463	Lodging	7.10	9.41	1,884,700
479	Gas/oil and repairs	14.60	19.36	3,877,600
488	Guide services/other recreation	1.65	2.19	438,600
	Total	52.10	69.08	13,843,900

[1] Borda, Charles, July 1998, *Recreation Economic Analysis, Canyon Ferry Reservoir*, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado.

Expansion and/or improvement of existing recreation facilities, and provisions of additional oversight, would lessen user conflicts. Increased attractiveness of the area would likely result in increased use of the area by some individuals. Those preferring less-developed and structured recreation experiences would probably go to other areas to meet their recreation needs.

Alternatives B and C (10-Percent Increase in Recreation Use).—To provide a range of expected economic impacts for Alternatives B and C, the recreation-related expenditures from table V-13 were entered into the IMPLAN model to estimate the impact of a 10-percent increase in recreation use on the local economy. If implementing Alternative B or C would increase visitor use by 10 percent, $20.2 million (1996 dollars) in total industrial output, 429 full- and part-time jobs, and $7.2 million in labor income would be the result—all based on recreation-related expenditures of $14,494,700 by visitors from "outside the local area" (tables V-13 and V-15).

Alternative C (20-Percent Increase in Recreation Use).—Alternative C was also analyzed to indicate the high end of the range of expected economic impacts that could occur if Alternative C resulted in a 20-percent increase in visitor use at the lake. For Alternative C,

Table V-13.—Alternatives B and C, 10-percent increase in visitor use
Recreation expenditure data for impact analysis for 1996[1]

IMPLAN sector number	IMPLAN sector description	Average 1988 expenditures ($) Per-person trip	Average 1988 expenditures ($) Indexed to 1996	Total expenditures ($) Based on 209,825 visits
421	Sporting and athletic goods	5.40	7.16	1,502,300
440	Transportation services	6.05	8.02	1,682,800
449	Other retail purchases	3.90	5.17	1,084,800
450	Groceries and beverages	7.70	10.21	2,142,300
454	Purchases of food and drink	5.70	7.56	1,586,300
463	Lodging	7.10	9.49	1,974,500
479	Gas/oil and repairs	14.60	19.36	4,062,200
488	Guide services/other recreation	1.65	2.21	459,500
	Total	52.10	69.18	14,494,700

[1] Borda, Charles, July 1998, *Recreation Economic Analysis, Canyon Ferry Reservoir*, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado.

the recreation-related expenditures from table V-14 were input into the IMPLAN model to estimate the impact of an increase in recreation use on the local economy. The results for a 20-percent increase in visitor use, due to implementing Alternative C, were $22.0 million (1996 dollars) in total industrial output, 468 full- and part-time jobs, and $7.9 million in labor income. These changes were based on recreation-related expenditures of $15,812,400 by visitors from "outside the local area" (tables V-14 and V-15).

User conflicts may increase because less space per individual is available.

Table V-15 shows a summary of the expected total economic impacts caused by changes in expenditure patterns resulting from implementing the action alternatives at Canyon Ferry Reservoir. Total impacts are made up of direct, indirect, and induced impacts. Recreation-related expenditures are the direct impacts associated with a particular alternative. Total industrial output includes recreation-related expenditures and indirect and induced impacts. Alternative A serves as the baseline for comparison purposes.

Table V-16 displays the changes in the four economic indicators, which were compared to the baseline condition. Changes in recreation use bring about proportional changes in these indicators. However, the effects of these changes are relatively minor. For example, the changes in labor income—or earnings by place of work in table V-13—range from $0.33 million to $1.32 million. These potential changes are minimal (0.04 percent to 0.17 percent) compared to the total earnings for Lewis and Clark County, which was $759.6 million in 1996.

Table V-14.—Alternative C, 20-percent increase in visitor use
Recreation expenditure data for impact analysis for 1996[1]

IMPLAN sector number	IMPLAN sector description	Average 1988 expenditures ($) Per-person trip	Average 1988 expenditures ($) Indexed to 1996	Total expenditures ($) Based on 228,900 visits
421	Sporting and athletic goods	5.40	7.16	1,638,900
440	Transportation services	6.05	8.02	1,835,800
449	Other retail purchases	3.90	5.17	1,183,400
450	Groceries and beverages	7.70	10.21	2,337,100
454	Purchases of food and drink	5.70	7.56	1,730,500
463	Lodging	7.10	9.41	2,153,900
479	Gas/oil and repairs	14.60	19.36	4,431,500
488	Guide services/other recreation	1.65	2.19	501,300
	Total	52.10	69.08	15,812,400

[1] Borda, Charles, July 1998, *Recreation Economic Analysis, Canyon Ferry Reservoir*, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado.

Table V-15.—Comparison of alternatives
Range of economic impacts due to increase in recreation use from visitors living outside the local area
(1996 dollars)

Unit of measure	Alternative A	Alternative B (+5 percent)	Alternatives B and C (+10 percent)	Alternative C (+20 percent)
Recreation-related expenditures	$13,177,200	$13,835,900	$14,494,700	$15,812,400
Total industrial output	$18,387,000	$19,306,100	$20,225,000	$22,064,000
Number of jobs	390	410	429	468
Labor income	$6,583,400	$6,912,500	$7,241,700	$7,900,000

Source: Bureau of Reclamation and IMPLAN, 1999.

Broadwater County, a much smaller economy, had earnings of $30.4 million for the same year. Yet, the total changes in labor income would still be relatively small (1.1 percent to 4.4 percent), even if the entire change was allocated to Broadwater County.

While a few individuals and firms may benefit from the increases in jobs (20 to 78 jobs), these increases would have little impact on the region's overall economy (39,137 jobs) (table V-10).

Table V-16.—Comparison of alternatives
Net changes in economic impacts due to increase in recreation use
from visitors living outside the local area
(1996 dollars)

Unit of measure	Alternative A	Alternative B (+5 percent)	Alternatives B and C (+10 percent)	Alternative C (+20 percent)
Recreation-related expenditures	No change	$658,678	$1,317,494	$2,635,195
Total industrial output	No change	919,095	1,838,381	3,677,050
Number of jobs	No change	20	39	78
Labor income	No change	$329,081	$658,230	$1,316,564

Source: Bureau of Reclamation and IMPLAN, 1999.

Similar comparisons hold true for industrial output. While total output may increase by $0.9 million to $3.7 million, such increases would be important only for those individuals and firms that are directly involved in recreation-related services. Such increases would have very little effect on the $2,190 million economy of the two counties (Industry Output, IMPLAN 1996 Canyon Ferry).

The impacts presented above represent the conditions that would have been in place had the alternatives been in effect in 1996, a sort of snapshot of annual impacts. Over the 10-year life of the project, the recreation-related expenditures, total industrial output, and labor income impacts would occur each year. The increase in the number of jobs attributable to the alternatives would occur during the first year—assuming the alternative is fully implemented during the first year. After that, no new jobs would be created, but the original increases in jobs would continue to be supported by the higher levels of recreation-related expenditures.

ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994, requires agencies to identify and address disproportionately adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of their decisions. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group of people should bear a disproportionate share of negative impacts from an environmental action. To comply with the environmental justice policy established by the Secretary, all Department of the Interior agencies are to identify and evaluate any anticipated effects, direct or indirect, from the proposed project, action, or decision

on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks. Accordingly, this section examines the anticipated distributional equity of alternative-associated impacts with respect to potentially affected minority and economically disadvantaged groups.

Affected Environment

The Broadwater and Lewis and Clark County region has a low minority population and a low percentage of population in poverty.

Minority population data for the counties in the study area, Broadwater and Lewis and Clark Counties, Montana, are shown in table V-17. In 1997, the minority population of the region was 4.4 percent, up from 4.3 percent in 1990. Neither county has a large minority population.

American Indian/Eskimo Aleut are the largest minority group in the region and both counties, followed by those of Hispanic origin, Asian/Pacific Islander, and Black.

In 1993, the percent of population below poverty in Broadwater (14.7) and Lewis and Clark (12.2) Counties was less than in the State of Montana (15.2).

Per capita income by Hispanic origin and race for 1989 is shown in table V-18. In Broadwater County, per capita income for the Hispanic and White groups was lower than for the same groups for the State of Montana, while per capita income for the American Indian/Eskimo Aleut and Asian/Pacific Islander groups was greater. Except for the Black group, each group in Lewis and Clark County had more per capita income than the same groups in the State of Montana. Overall, the per capita income for Broadwater and Lewis and Clark Counties is less than for the State of Montana.

Environmental Consequences

Alternative A.—There would be no adverse environmental justice impacts because activities would continue as before.

Alternative B.—As discussed in the "Socioeconomics" section, there would be some increase in economic activities in the region, including increases in income and employment. Positive impacts to the recreation-related sectors could have positive environmental justice impacts on minority and low-income workers. Because of the increase in recreation-related production, these individuals might be able to find new or additional work in the local area. The overall increase in regional income would probably not change the percentage of population in poverty in the region.

Table V-17.—Population, 1990 and 1997

Broadwater County	Total	Hispanic	%	Non-Hispanic White	%	Black	%	Amer Ind Esk/Aleut	%	Asian Pac Islander	%	Minority (non-White)	%
1990[1]	3,336	33	0.99	3,232	96.88	1	.03	65	1.95	5	.15	104	3.12
1997[2]	4,095	43	1.05	3,970	96.95	1	.02	74	1.81	6	.17	125	3.05

Lewis and Clark County	Total	Hispanic	%	Non-Hispanic White	%	Black	%	Amer Ind Esk/Aleut	%	Asian Pac Islander	%	Minority (non-White)	%
1990[3]	47,625	645	1.35	45,539	95.62	160	.33	1,016	2.13	265	.55	2,086	4.38
1997[4]	53,329	700	1.31	50,934	95.51	87	.16	1,302	2.45	306	.57	2,395	4.49

Region	Total	Hispanic	%	Non-Hispanic White	%	Black	%	Amer Ind Esk/Aleut	%	Asian Pac Islander	%	Minority (non-White)	%
1990	50,961	678	1.33	48,771	95.70	161	.32	1,081	2.12	270	.53	2,190	4.30
1997	57,424	743	1.29	54,904	95.61	88	.15	1,376	2.40	313	.55	2,520	4.39

[1] http://govinfo.library.orst.edu/cgi-bin/...e=nm&county=Broadwater&table=Summary+Report
[2] http://govinfo.library.orst.edu/cgi-bin/pe-list?map=01-053.nmc
[3] http://govinfo.library.orst.edu/cgi-bin/...te=nm&county=Lewis & Clark&table=Summary+Report
[4] http://govinfo.library.orst.edu/cgi-bin/pe-list?map=01-051.nmc

Table V-18.—1989 per capita income ($)[1]

	All persons	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Amer Ind Esk/Aleut	Non-Hispanic Asian Pac Islander
Broadwater County	10,125	5,380	10,063	0	15,656	13,000
Lewis and Clark County	12,342	8,654	12,495	5,695	7,278	9,990
State of Montana	14,741	6,021	11,634	7,657	5,422	8,443

[1] http://govinfo.library.orst.edu/cgi-bin/

Alternative C.—Environmental justice impacts associated with this alternative would probably be positive and similar to Alternative B, with slightly more employment opportunities for which minority and low-income individuals could compete.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

No adverse impacts are expected; thus, mitigation is not needed.

HERITAGE RESOURCES

Affected Environment

Background.—Since the mid-1940s, both intensive and nonintensive heritage resource surveys have been conducted at Canyon Ferry Reservoir. Most, but not all, of these studies have been carried out to comply with one or more of the many Federal laws and regulations. Most of these laws and regulations direct Federal agencies to manage heritage resources and consider the effects of their projects on prehistoric and historic remains. Other laws (the Archeological Resources Protection Act, for example) are applicable to the general public and prohibit excavation of, or collection of, artifacts from any and all federally owned lands without permission from the Federal agency having jurisdiction.

Federal laws are designed to protect heritage resources for future generations and to promote the scientific study of these resources. Without such study, we would not know of the abiding richness of prehistoric and historic resources associated with Canyon Ferry Reservoir.

In the 1940s, the Smithsonian Institution River Basin Survey, the National Park Service, and Montana State University in Missoula (now the University of Montana) conducted reconnaissance level (nonintensive) archeological surveys of the location of the proposed Canyon Ferry Reservoir. Subsequent to the survey, Montana State University tested and/or excavated at selected sites that would be inundated by the reservoir. This research revealed 22 prehistoric Indian sites, ranging from extensive campsites to caves and rock shelters, tipi rings, and petroglyphs. Some of these sites probably date back several thousand years, while others may have been used by Tribes in more recent prehistoric or early historic times.

During the 1970s and 1980s, several archeological surveys sponsored by the National Park Service and Reclamation were conducted at Canyon Ferry. In addition, an intensive inventory of the Federal land (about 8,500 acres), including the shoreline belt above and below maximum pool level, was carried out under contract with Reclamation (Grieser et al., 1983). Numerous historic, prehistoric, and Paleontological sites were recorded around the reservoir. Many of these sites are now inundated. Also in the 1980s, Reclamation contracted for the analyses of a large collection of artifacts from the reservoir (Grieser, 1987). The analyses indicated that this stretch of the Missouri River has been inhabited or used intermittently for at least 10,000 years.

Since those early surveys, heritage resource inventories have focused on specific projects or problem areas. For example, one survey (Pfaff, 1996) concentrated on historic resources that were not previously recorded. Numerous Class II heritage resource surveys have been completed on or near the cabin sites. Large heritage resource surveys in 1950 and 1987 included the cabin sites. The presence or absence of heritage resources on the cabin sites and immediate area has been well documented.

Prehistoric Period Resources.—All this research has revealed prehistoric sites and use areas that demonstrate the rich heritage of the area. Artifact scatters, fire hearths, caves and shelters, kill sites, and pictographs indicate an intensive use during prehistoric times, although there was no permanent habitation, and there were sites containing tipi rings. Many of the prehistoric sites at Canyon Ferry have been determined to be eligible for the *National Register of Historic Places* (*National Register*). Because of the fragile nature of prehistoric sites, it is extremely important for information to be gathered from these resources before they are destroyed by development or erosion. Such a step will yield information important to our understanding of the prehistory of the region.

Historic Period Resources.—In the 1990s, Reclamation conducted an additional survey of Canyon Ferry, focusing on sites of the historic period. Most of these sites are associated with Reclamation's history at the reservoir, although some are homestead period sites.

During the historic period, Blackfeet, Gros Ventre, and Shoshone Indians are reported to have used the Canyon Ferry area. Early oral history speaks of a major Native American crossing of

the river just north of Townsend, near the mouth of Spring Creek (Greiser, 1987). Indians were reported on the Missouri River bottomlands at the mouth of Beaver Creek, near the mouth of Avalanche Gulch, and at Dry Creek. Most of these groups were trapping and hunting parties.

Although there was some horse stealing from the mining camps, and concern about Indian attacks lingered though the mid-1800s, no major conflicts have been recorded in this area. By the 1870s, Indian traffic through this portion of the valley had virtually ended.

In 1805, Lewis and Clark made three camps in the area. The first was just above the old town of Canyon Ferry, on July 21; the second was on 1 of 10 islands near the mouth of Duck Creek, on July 22; and the third camp was near Townsend, on July 23. On their entry to the area, they describe the mountains suddenly falling away and a beautiful and extensive plain 10 or 12 miles wide, extending as far upriver as the eye could see. As part of the expedition's return trip the following year, Sergeant John Ordway floated downstream through this area.

After the Lewis and Clark expedition, and until the mid-1860s, trappers, traders, and surveying expeditions shared the valley with the Indians.

About that time, gold was discovered in Last Chance Gulch, in Helena. Discoveries were subsequently made on French Bar, just below the current dam site; Cave Gulch; White City, in White Gulch; and Diamond City, in Confederate Gulch, near the crest of the Big Belt Mountains. Cave Gulch was named for the common collapse of its mine shafts. Canyon Ferry Village lies on part of the former site of Cavetown, a village of about 30 hewn-log houses that were abandoned by 1876 (Mattes, 1949). Diamond City was once the most prosperous mining town in Montana. Confederate prisoners, exiled to Montana in 1864, made the first strike here, giving the gulch its name and producing the richest mine on record in the United States. "One day's cleanup netted 700 pounds of gold, amounting to $114,800, taken out by 20 men using wheelbarrows to dump the dirt in sluice boxes."

These discoveries led to a tremendous influx of gold seekers, causing many new mines to be opened in the late 1860s and 1870s—mines and gulches that bear the names of present-day recreation sites at Canyon Ferry—Confederate, White, Cave, Avalanche, Hellgate, and Magpie. At one time during the peak of the gold rush, an estimated 10,000 people were mining the gulches around Canyon Ferry. Silver mining also contributed an influx of miners at this time. Hard-rock mining continued in the area until the early 1900s, but was less lucrative. Those who could not make a living mining turned to the land as a means of survival. This agricultural base proved essential in the early 1890s, when the placer mines were exhausted and the silver market collapsed.

Transportation between the early-day settlements became essential. Diamond City and White Sulphur Springs were connected with Helena by a stage road, a trip of about 2-1/2 hours. The crossing of the Missouri River was by a ferry, established by John Oakes in 1865 and named Canyon Ferry because it was at the point where the river narrowed at Black Rock Canyon. A man by the name of Court Sheriff eventually assumed the ferry operation and held land upon

which a small town grew, associated with the ferry. Remnants of this town were visible until the reservoir was flooded. The Sheriff residence was saved and moved to a site just north of present Canyon Ferry Village, where it serves as a residence. The present Canyon Ferry Village Visitor Center once served as the school house at the old town of Canyon Ferry.

On the east shore, about 6 miles north of Townsend, was the town of Canton, once a supply center for farms and nearby mining communities. Canton was located in the middle of the flat river plain, surrounded by farms. St. Joseph Church, now standing along Highway 284, south of Duck Creek Road, is one of the oldest surviving church structures in Montana, dedicated near Canton in 1876 (Helena Independent Record, July 3, 1949).

Not to be ignored is the relative abundance of agriculture in this Missouri River valley before inundation by the reservoir. Thomas P. Roberts, who made a reconnaissance trip from Three Forks to Great Falls in 1872, recognized this section as "one of the best grazing and agricultural districts of this mountainous territory."

During the 1880s, attempts were made to navigate the upper Missouri River for freight and passenger business. Considerable trade was established by W.F. Wheeler and Judge N. Hilger before undependable revenue and the hazardous conditions of the river halted the endeavors.

Steamboats were also unable to compete with the railroads that served the region by the mid-1880s. Agriculture and small enterprises had an economic base strong enough to keep the region growing, and, in 1894, Helena became the State capitol.

In the early 1890s, several businessmen from Helena proposed a dam at Stubbs Ferry, 10 miles below the present Canyon Ferry Dam, but plans were unsuccessful. Helena Water and Electric Power Company, the second group wanting to use the waters of the Missouri River, started dam construction just above old Canyon Ferry in 1896. The wood and earth dam and powerplant were finished in October 1898, creating Lake Sewell, 7 miles long and 2 to 3 miles wide. The lake submerged portions of the Sheriff property, other ranch property, and portions of the old stage line. The river below the dam was so rough that the ferry had to be abandoned, and the river had to be crossed in rowboats, upstream, until a bridge was built in 1899. Electrical power was supplied from the dam to the smelter in east Helena. The newly formed Missouri River Power Company purchased the dam and power station in December 1900. Because of financial problems, the company merged with United Missouri River Power Company in 1911, becoming Missouri River Electric and Power Company later that year. In 1912, the dam and powerplant was again sold, this time becoming property of the new MPC.

The dam and powerplant remained in the control of MPC until early 1950, when Reclamation purchased it. The purchase of the old dam and powerplant was to make way for a new dam that had been started in July 1949, in spite of protest from farm families whose lands would by flooded by the project. The purchase was made as part of the Missouri River Basin Project, authorized by the Flood Control Act of December 1944. The project was finished in April 1954, when the plant began to produce electricity.

Other remnants of history exist in the area's cemeteries. The reservoir inundated the former Beaver Creek Cemetery and separated Canyon Ferry Cemetery from the shore on what is now Cemetery Island. The Beaver Creek graves were moved to Helena, Townsend, and Winston, according to the wishes of families. The oldest grave at the Beaver Creek site was that of young Alice Wimpey, who, according to hearsay, died on a wagon train en route to Helena in 1867 (Helena Independent Record, November 24, 1949). About 50 graves remain on Cemetery Island. Many of the graves are from the late 1800s, the oldest dating back to 1874. Vandalism and neglect of the cemetery have prompted citizen groups to initiate a program to recognize, preserve, and maintain the site.

Construction of Canyon Ferry Dam and Reservoir resulted in numerous changes to the cultural landscape. Most of the historic homesteads were either obliterated, reclaimed, or inundated, and are no longer visible. Those above the reservoir usually contain no architecture today but show only the foundations of structures. The history of the families who inhabited these sites remains to be written, and the archeological information contained in these sites may help to write that history.

Reclamation is also responsible for historic remains associated with the construction of the dam. Among these are the Government Camp buildings. Within the Government Camp is one of the most significant historic sites at Canyon Ferry. This is the Canyon Ferry School House, now a Visitor Center and museum. This historic structure is one of the best preserved turn-of-the-century school houses in the area. Although it was moved from the town of Canyon Ferry to its present location in the camp in 1949, it has been determined to be of *National Register* significance for its architectural value. Although many other historic sites at Canyon Ferry have been evaluated as potentially eligible for the *National Register,* none are currently listed.

Future Heritage Resources Focus.—The Federal Government is required by law and regulations to protect and preserve significant heritage resources. To this end, all Federal undertakings are subject to compliance with the process required by the National Historic Preservation Act and its regulations in 36 CFR Part 800. These mandates require that the Government consider the effects of its actions on prehistoric and historic resources before implementing those actions. Since 1988, Reclamation has had more than 150 undertakings at Canyon Ferry. An integral part of this process is the review by the Montana State Historic Preservation Office (SHPO). If the project is determined to have an effect, the Government must seek measures which will reduce or mitigate the effect. The SHPO is an active participant in the compliance process, as are Native American Tribes and other interested parties.

Paleontological Resources.—Paleontological resources are, by their very nature, fragile and nonrenewable resources which are protected by law. In 1986, a paleontological survey was conducted at Canyon Ferry, and several locales of Tertiary age were recorded. Since that survey, several paleontological research projects have taken place. Each project focused on specific vertebrate and nonvertebrate remains at the reservoir. Researchers probably will

continue to conduct investigations as additional sites are exposed by erosion. For example, in 1998, conscientious recreationists reported to Reclamation a new locale which will be investigated.

Environmental Consequences

Alternative A.—Heritage resources would be managed at the minimum level required by law.

Alternative B.—Enhancement of the natural resources, with a moderate increase in recreation development, would impact the heritage resources in various ways. Stabilization of vegetation and soil erosion will result in preservation of heritage resources on or near the surface of the soil. Fencing of boundaries and control of traffic will also limit the impact on heritage resources. Heritage resource inventories for areas of undertakings will add to the knowledge base for the Canyon Ferry area.

Alternative C.—Alternative C would result in development of a program to monitor heritage resource sites and implement a systematic process to report damage. A specific heritage resources management plan would be developed and implemented. This would include periodic and systematic inventories for heritage and paleontological resources. A public archeological program to enhance visitor experiences through interpretive signage and other measures would be developed. Development of a heritage resource management plan would protect heritage resources for the long term.

Cumulative Impacts

Impacts on heritage resources tend to be cumulative. Slow erosion over time will completely destroy an archeological site. Increased usage of an area, which can disturb existing vegetation and, thus, increase erosion, will also destroy heritage resources. Direct impacts, such as artifact collection, vandalism, and excavation, also increase with larger numbers of people using an area.

Mitigation

Existing statutes require that heritage resources be protected. As impacts increase over time, measures will have to be taken to either prevent or mitigate impacts on the resources. Although some impacts may be avoided by project relocation, other impacts will require mitigation.

Mitigation may include activities such as excavations, detailed recordation, or development of interpretive areas. Specific mitigative measures will be developed on a case-by-case basis, with consultation as required by the National Historic Preservation Act and other statutes.

INDIAN TRUST ASSETS

Affected Environment

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian Tribes or individuals. Examples of things that may be ITAs are lands, minerals, hunting and fishing rights, and water rights. The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian Tribes or Indian individuals by treaties, statutes, and Executive orders; these rights are sometimes further interpreted through court decisions and regulations. The trust responsibility requires that all Federal agencies, including Reclamation, take all actions reasonably necessary to protect trust assets.

Environmental Consequences

Alternative A.—Under the No Action Alternative, Reclamation will continue to perform activities as before and will continue to consult with Tribes as noted in the NEPA regulations and in accordance with the ITA policy.

Alternative B.—Any of the moderate development proposals in this alternative would require more consultation with Tribes. There might be instances where proposed activities would be revised or altered if assets are identified in the area. Research should be done to confirm the ITAs on the lands managed by Reclamation.

Alternative C.—With the additional development listed in this alternative, more potential conflicts with ITAs are possible. As with Alternative B, research should be done to confirm the ITAs on the lands managed by Reclamation.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

If consultations determine adverse impacts are occurring (Alternative A), or would occur from implementation of any action alternative, Reclamation would seek means to avoid adverse impacts. If adverse impacts cannot be avoided, Reclamation would provide appropriate mitigation or compensation.

INDIAN SACRED SITES

Affected Environment

Indian sacred sites are defined in Executive Order 13007 as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, and Indian religion: provided that the Tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Federal agencies are required, to the extent practicable, to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sites.

Environmental Consequences

Alternative A.—Under the No Action Alternative, Reclamation will continue to perform activities as before and will continue to consult with Tribes.

Alternative B.—Any of the moderate development proposals in this alternative would require more consultation with Tribes. There might be instances where proposed activities would be revised or altered if assets are identified in the area.

Alternative C.—With the additional development listed in this alternative, more potential conflicts with ITAs are possible. As with Alternative B, research should be done to confirm the location of sacred sites on the lands managed by Reclamation or the absence of such sites.

Cumulative Impacts

No cumulative impacts have been identified.

Mitigation

Executive Order 13007 does not authorize agencies to mitigate for the impact of their actions on Indian sacred sites. However, it does direct them to avoid adverse impacts when possible. If consultations determine that adverse impacts are occurring (Alternative A), or would occur from implementation of any action alternative, then Reclamation would seek means to avoid adverse impacts.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are assumed to be long-term impacts to resources that would be affected by implementing the RMP/EA. No unavoidable adverse impacts are expected as a result of this Federal action.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

For this Federal action, short term is defined as the 10-year planning life of the RMP. Implementation strategies proposed in the RMP will be accomplished within the 10-year timeframe. Even though rehabilitating and revegetating certain areas to their natural state may require more than 10 years, that process will begin during the planning life of the RMP/EA (short term). Long term is defined as any time period beyond the 10-year planning life of the RMP and the remaining life of the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program. As long as the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program is used for water storage for agriculture, flood control, power generation, and other legal purposes, pressure on the natural resources within the study area will continue. This long-term pressure can be attributed to: (1) Reclamation's efforts to accommodate visitor use through development of public use facilities and (2) the use of the dam and reservoir for its beneficiaries (i.e., agri-cultural, recreational, power, and fish and wildlife users).

The management actions detailed in this document are intended to reverse the deterioration of the environment that is occurring under the current conditions. It is assumed that the short- and long-term goals and objectives for managing the area would not change over time and that there will be no loss of productivity of the natural and social environment.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable commitments are considered to be the permanent reduction or loss of a resource.

Implementation of any of the alternatives would not result in any irreversible loss of resources. Any irreversible commitment of resources would be attributed to the use of Federal lands for the original construction of the dam, reservoir, and associated conveyance features. These resources have already been irreversibly committed for the life of the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program.

No irretrievable commitments of resources are considered under any of the action alternatives. Although the action alternatives suggest different degrees of development and increased visitor use, they are intended to either enhance or protect the wildlife and the recreational and physical resources within the Canyon Ferry Reservoir study area. Implementation of the No Action Alternative may have negative and irreversible effects on wildlife and fish habitat, soils, and water quality. Additional information and analysis would be needed to determine if the No Action Alternative would so negatively affect the existing resources that the loss of resources would be considered irretrievable. If the RMP were not implemented, the irreversible commitment of existing resources would essentially be the same as if the No Action Alternative were implemented.